Economic Analysis of Critical Habitat Designation for Bay Checkerspot Butterfly

San Mateo and Santa Clara Counties, California

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Executive Summary

The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed revised critical habitat designation for the Bay Checkerspot Butterfly (butterfly). This report was prepared by Berkeley Economic Consulting (BEC) under contract with the U.S. Fish and Wildlife Service (the Service).

In its proposed revision of butterfly critical habitat, the Service identifies 19,746 acres in the study area (defined as areas proposed for critical habitat and areas proposed for exclusion from final critical habitat); 18,971 acres are proposed for final critical habitat for the butterfly.[1] The proposed revised critical habitat is hereinafter referred to as "proposed critical habitat." The study area is divided into twelve units. Figures ES-1 through ES-13 show the areas of proposed critical habitat, areas proposed for exclusion from critical habitat and current landowners or managers. As shown in the figures, private landowners own the majority of the proposed critical habitat (15,175 acres). Other landowners or managers include: the Santa Clara Valley Water District (SCVWD) (906 acres), Stanford University (329 acres), San Francisco Public Utilities Commission (SFPUC) (245 acres), and other city and county parks departments (2,645 acres). Within the area proposed for exclusion from final critical habitat designation, landowners or managers include: San Mateo County (552 acres), private landowners (198 acres), and California Department of Fish and Game (25 acres).[2]

This analysis quantifies economic impacts of butterfly conservation efforts on each potentially affected entity – typically landowners or managers – associated with the following threats: (1) urban development; (2) invasion of nonnative plants caused by air pollution; (3) pesticide use; and (4) over and under grazing.[3] All impacts in the Executive Summary, Sections 2 and 3, and Appendix A are presented in 2008 dollars using a three percent discount rate, unless noted otherwise. Appendix D presents impacts at zero and seven percent discount rates. Ranking of economic impacts to the different entities and in the different units are not sensitive to alternate discount rates.

Sections 2 and 3 of this report consider the baseline and incremental impacts of butterfly conservation efforts. Baseline impacts include those associated with overlapping protections from other Federal, State, and local laws that aid habitat conservation in the study area. Incremental impacts are expected to occur solely because of the designation of critical habitat; these would not be expected to occur but for the designation of critical habitat.

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[1] 72 FR 48187-90, Proposed Rule.

[2] *Ibid.*

[3] These activities were identified in the proposed rule as threats to the species that may require special management, 72 FR 48183-84.

The Key Findings highlighted below and Tables ES-1 through ES-3 summarize the quantitative results of the analysis. In addition, all estimated impacts are divided into pre-designation (1998 - 2008) and post-designation (2008-2030) impacts.[4]

Table ES-1 presents the total baseline economic impacts associated with each activity, each unit, and each entity in proposed critical habitat, while Table ES-2 presents the estimated incremental economic impacts that result solely from the designation of critical habitat. The impacts in areas proposed for exclusion from critical habitat according to section 4(b)2 of the Act, which are baseline impacts, are shown in Table ES-3.

The primary sources of information for this report were communications with and data provided by personnel from the Service, Federal agencies, California State governments and institutions, local government agencies in San Mateo and Santa Clara Counties, and potentially affected private entities. In addition, this analysis relies on the Service's section 7 consultation history, and existing habitat management and conservation plans that consider the butterfly.

A screening analysis of potential effects on the energy industry and small entities was conducted. Designation of critical habitat is not expected to lead to a reduction in electricity production or an increase in the cost of energy production or distribution. As a result of the screening analysis, no small entities were found to potentially be affected by the proposed rule. Please see Appendix C for a summary of the results of the screening analysis.

Key Findings

This section summarizes the most significant impacts of critical habitat designation. Table ES-1 presents the total baseline economic impacts associated with each activity, each unit, and each landowner or land manager in proposed critical habitat. Total future baseline impacts are expected to be $390 million. Notable baseline impacts include those that may result from the implementation of the Santa Clara Valley Habitat Conservation Plan / Natural Community Conservation Plan (SCVHCP / NCCP, or Plan). Although not all conservation efforts in the Plan are solely attributable to the butterfly (there are approximately 30 species covered by the Plan), the butterfly is an important factor in developing the conditions of the SCVHCP / NCCP. The impacts of implementing the SCVHCP / NCCP included in this economic analysis reflect only the conservation efforts that occur within the area of proposed critical habitat for the butterfly. All conservation efforts specified in the Plan that aid in the conservation of the butterfly are baseline impacts, even if they serve to benefit other species at the same time.

As presented in Table ES-2, this analysis predicts incremental impacts in the range of approximately zero to $750,000 as a result of the critical habitat designation. This is primarily due to restrictions on the location of compensation land for development projects. The impacts are presented as a range due to uncertainty in estimating the probability of triggering a federal nexus.

[4] "Pre-designation" and "post-designation" in this report refer to the revised final critical habitat designation expected in 2008.

Table ES-1: Summary of Estimated Baseline Economic Impacts

Unit	Entity/Plan	Past Impacts	Future Impacts	Annualized Future Impacts
5,6,7,9a, 10,12	Private Landowners	$0	$380,000,000	$23,000,000
3	Private Landowners	$0	$0 - $510,000	$0 - $31,000
2,3,4,5,6, 7,8,11	Other Conservation Efforts	$410,000	$410,000	$24,000
5	Calpine	$4,400,000	$1,200,000	$74,000
	VTA	$6,400,000	$0	$0
5,6,7,8,9a,9b, 10,11,12	SCVHCP / NCCP	$0	$12,000,000	$750,000
Total Impacts[(1)]		**$11,000,000**	**$390,000,000**	**$24,000,000**
Alternative Discount Rates[(5)]				
zero percent		$9,000,000	$550,000,000	$24,000,000
seven percent		$15,000,000	$270,000,000	$24,000,000

Notes:

(1) VTA = Valley Transportation Authority.

(2) Total impacts are presented in 2008 dollars at a three percent discount rate.

(3) Sum of impacts to each entity / plan may not equal the total due to rounding.

(4) Total not presented as range because the range of impacts to private landowners in unit 3 is much smaller than the total. Range is lost when rounding the total.

(5) Alternative discount rates of zero and seven percent presented in the Executive Summary for comparison to the preferred rate of three percent. Please see Table D-1 for more detail of baseline impacts at alternative discount rates.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) DataQuick Information Systems.

(4) Marshal and Swift Construction Costs.

(5) Office of Federal Housing Enterprise Oversight.

(6) Principal, Jones & Stokes.

(7) Environmental Planning Manager for VTA.

(8) Stanford University Jasper Ridge Biological Preserve website.

(9) Planner for SFPUC Watershed Group.

(10) Muni Financial, Financial Consultant for the SCVHCP/NCCP.

(11) SCVHCP Budget Model from November 2007.

Table ES-2 presents the estimated incremental economic impacts that result solely from the designation of critical habitat. These impacts may result from restrictions on the location of compensation land for development projects.

Table ES-2: Summary of Estimated Incremental Economic Impacts

	Unit	Entity	Past Impacts	Future Impacts	Annualized Future Impacts
Total Impacts[(1)]					
	3	Private Landowners	**$0**	**$0 - $750,000**	**$0 - $46,000**
Alternative Discount Rates[(2)]					
zero percent	3	Private Landowners	$0	$0 - $1,100,000	$0 - $46,000
seven percent	3	Private Landowners	$0	$0 - $510,000	$0 - $46,000

Notes:
(1) Total impacts are presented in 2008 dollars at a three percent discount rate.
(2) Alternative discount rates of zero and seven percent presented in the Executive Summary for comparison to the preferred rate of three percent. Please see Table D-2 for more detail of incremental impacts at alternative discount rates.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Review of relevant biological opinions
(3) Personal communication with David Moser, McCutchen, Doyle, Brown & Enersen, LLP, November 20, 2007.
(4) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

Table ES-3 shows the impacts in areas proposed for exclusion from critical habitat according to section 4(b)2 of the Act, which are all baseline impacts, unaffected by the designation of critical habitat. These impacts reflect the future cost of administering the San Bruno Mountain Habitat Conservation Plan (SBMHCP) for the benefit of the butterfly.

Table ES-3: Summary of Estimated Economic Impacts in Areas Proposed for Exclusion from Critical Habitat According to Section 4(b)2 of the Act

Unit	Management Plan	Future Impacts	Annualized Future Impacts
1	SBMHCP	$2,700,000	$160,000

Notes:
(1) Impacts are presented in 2008 dollars at a three percent discount rate.
(2) See Table D-3 for impacts at alternative discount rates.
Source:
(1) SBMHCP Budget Projection, October 11, 2007.

Figure ES-1: All Proposed Critical Habitat Units for the Bay Checkerspot Butterfly

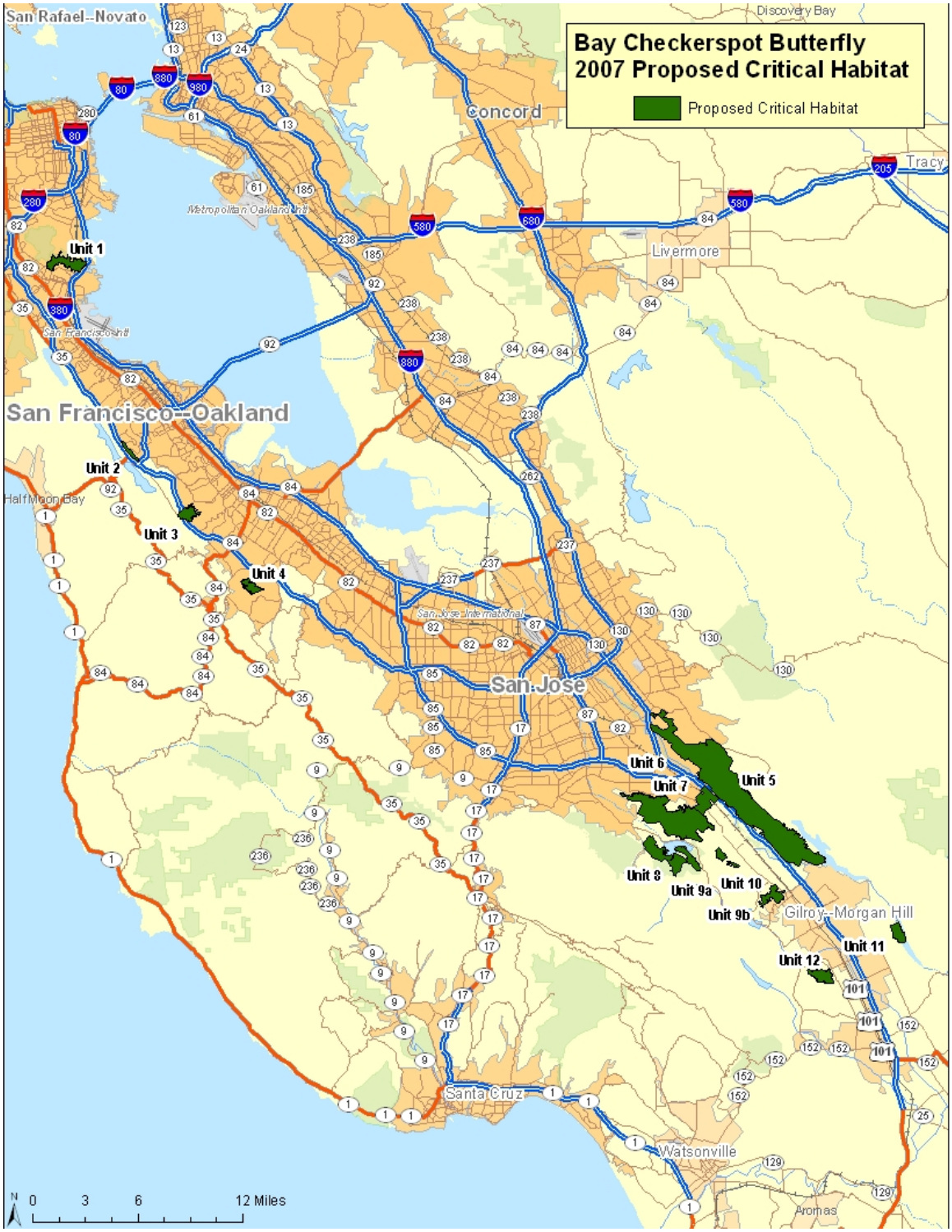


Figure ES-2: Ownership in Unit 1
(Proposed for Exclusion from Critical Habitat)

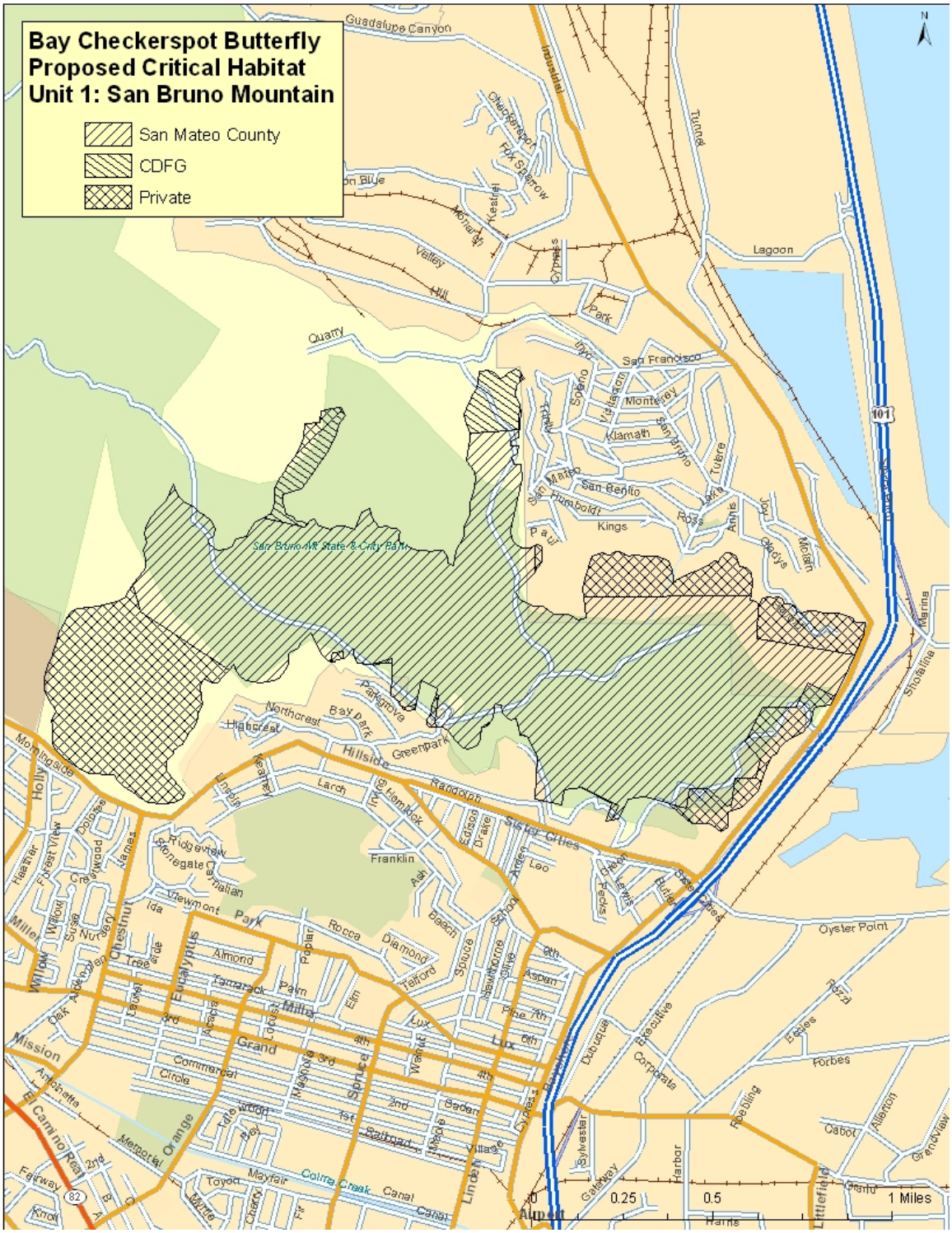


Figure ES-3: Ownership in Unit 2

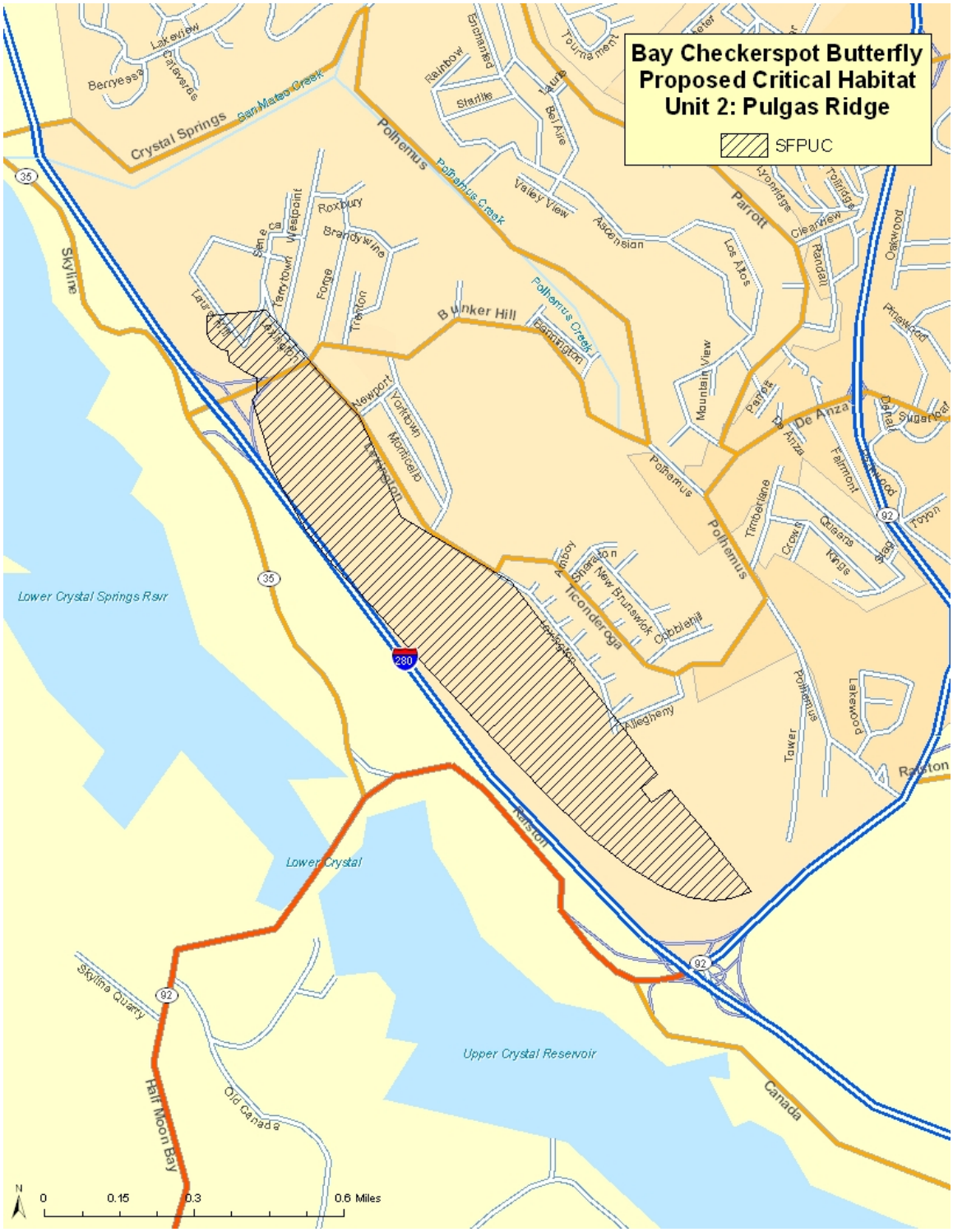


Figure ES-4: Ownership in Unit 3

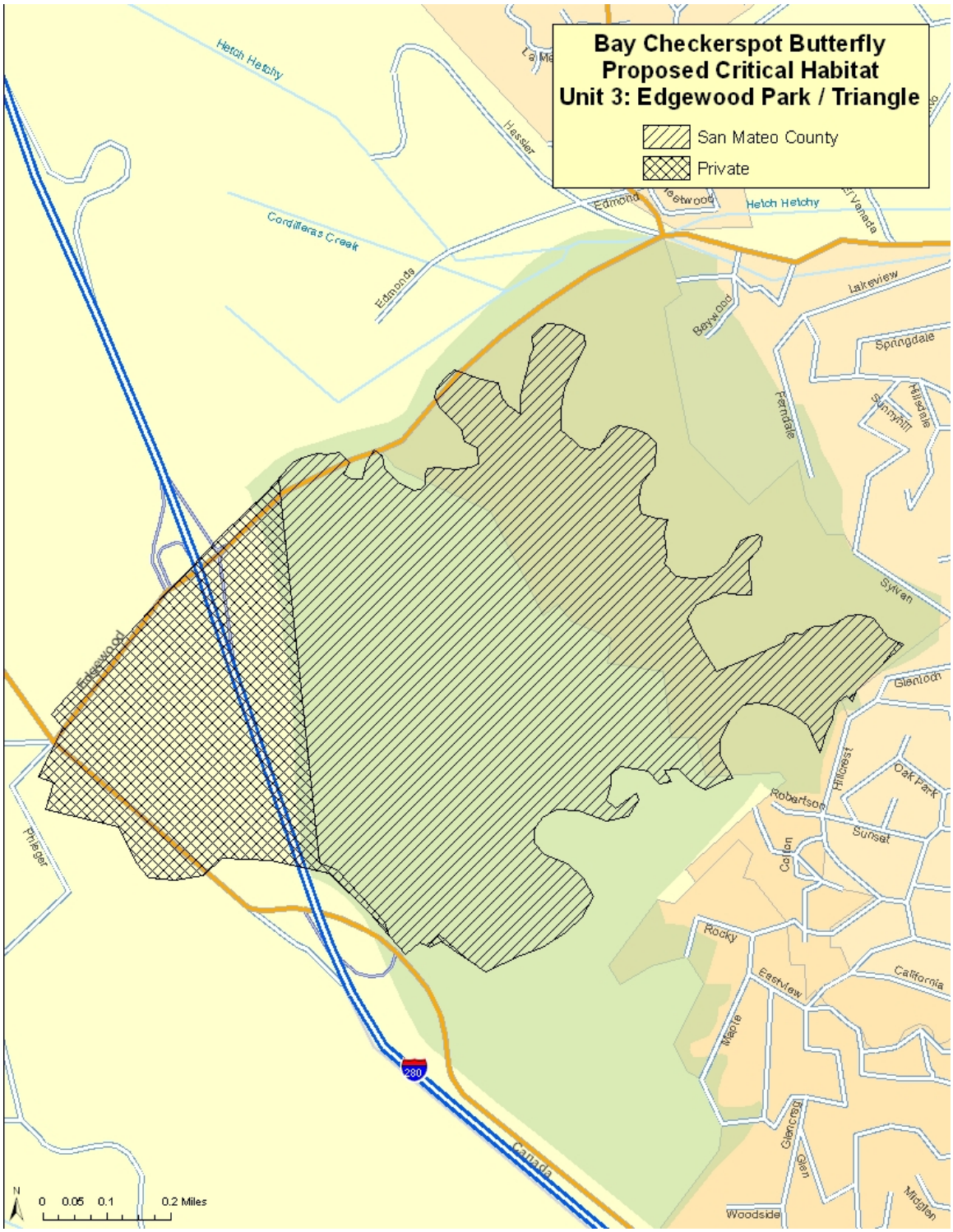


Figure ES-5: Ownership in Unit 4

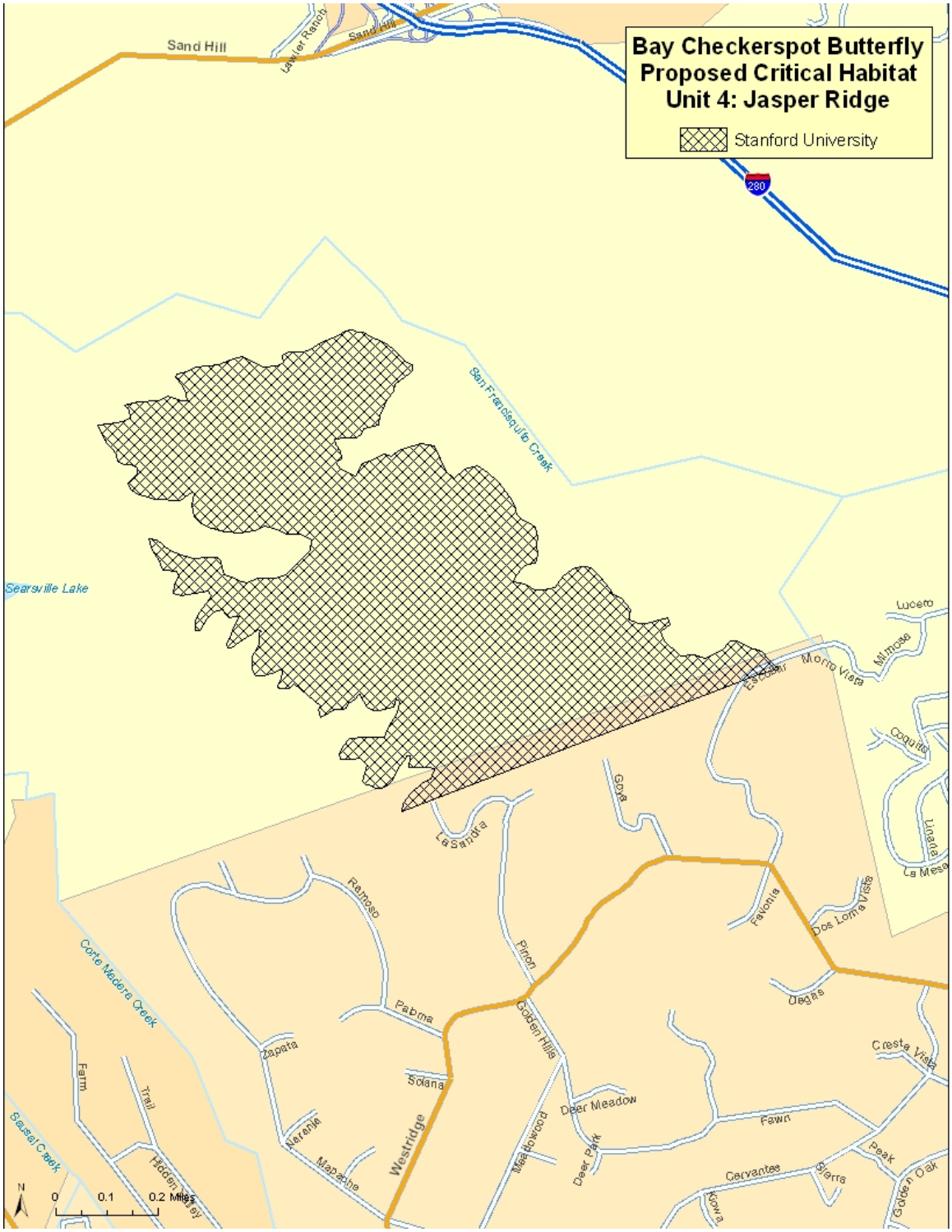


Figure ES-6: Ownership in Unit 5

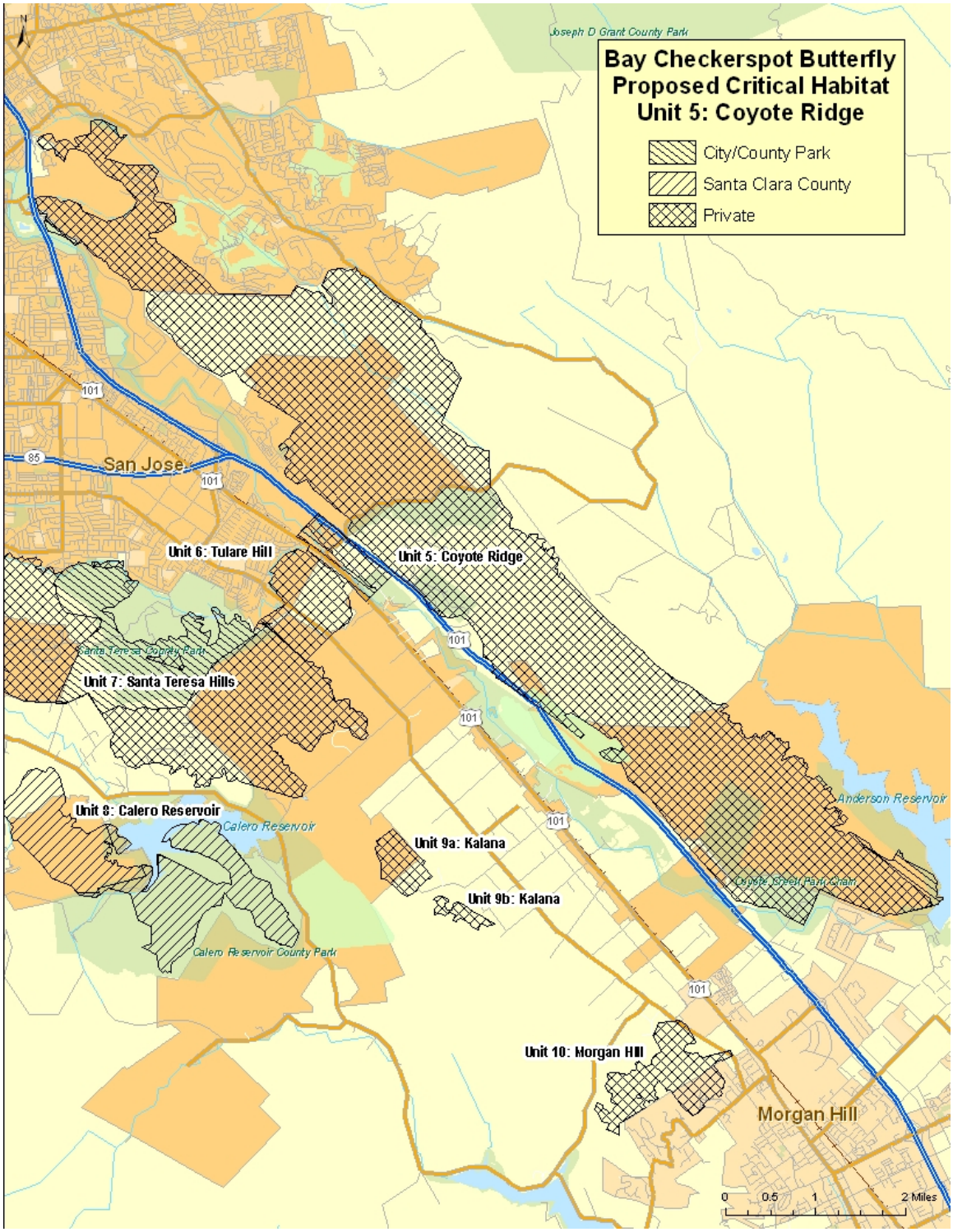


Figure ES-7: Ownership in Unit 6

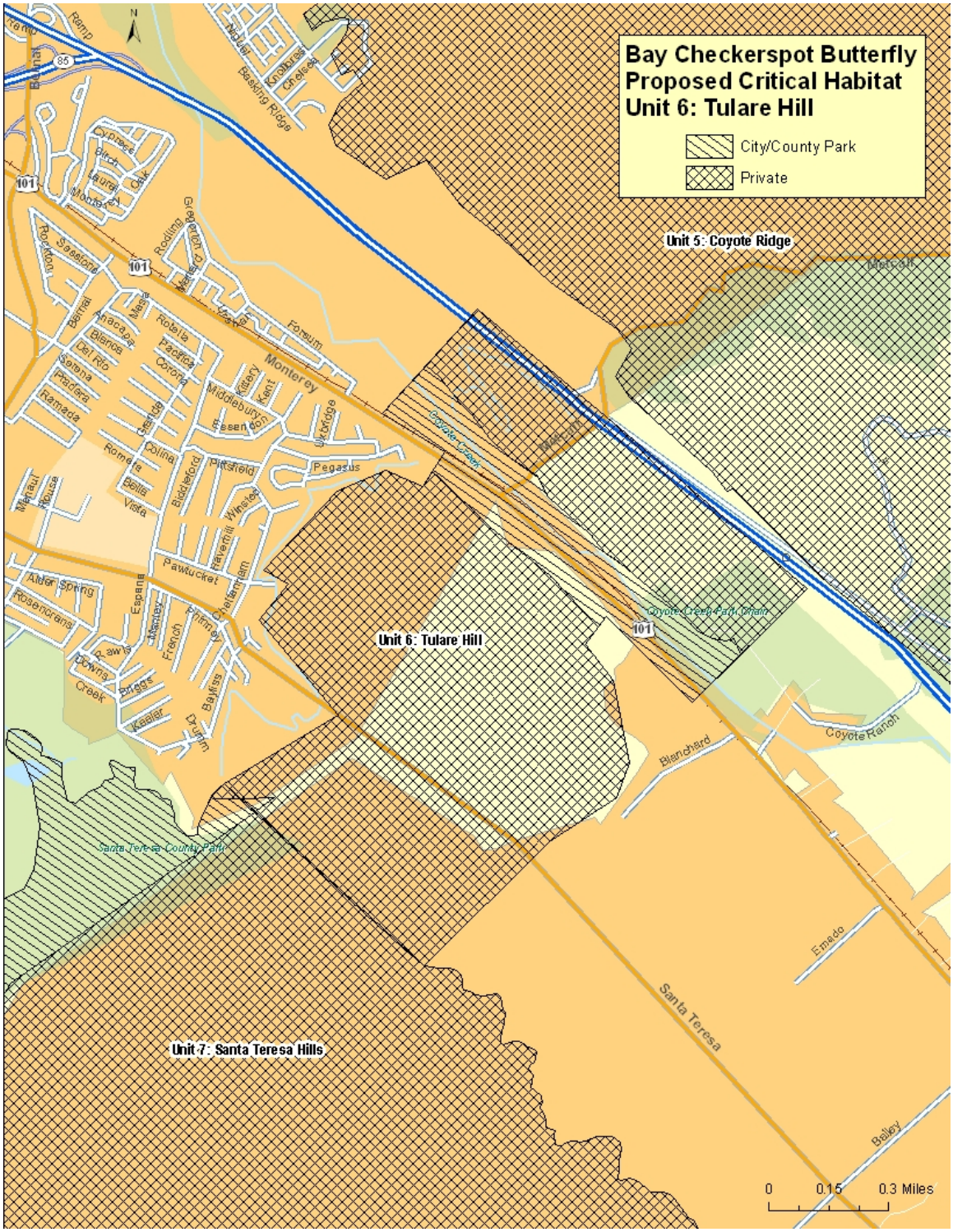


Figure ES-8: Ownership in Unit 7

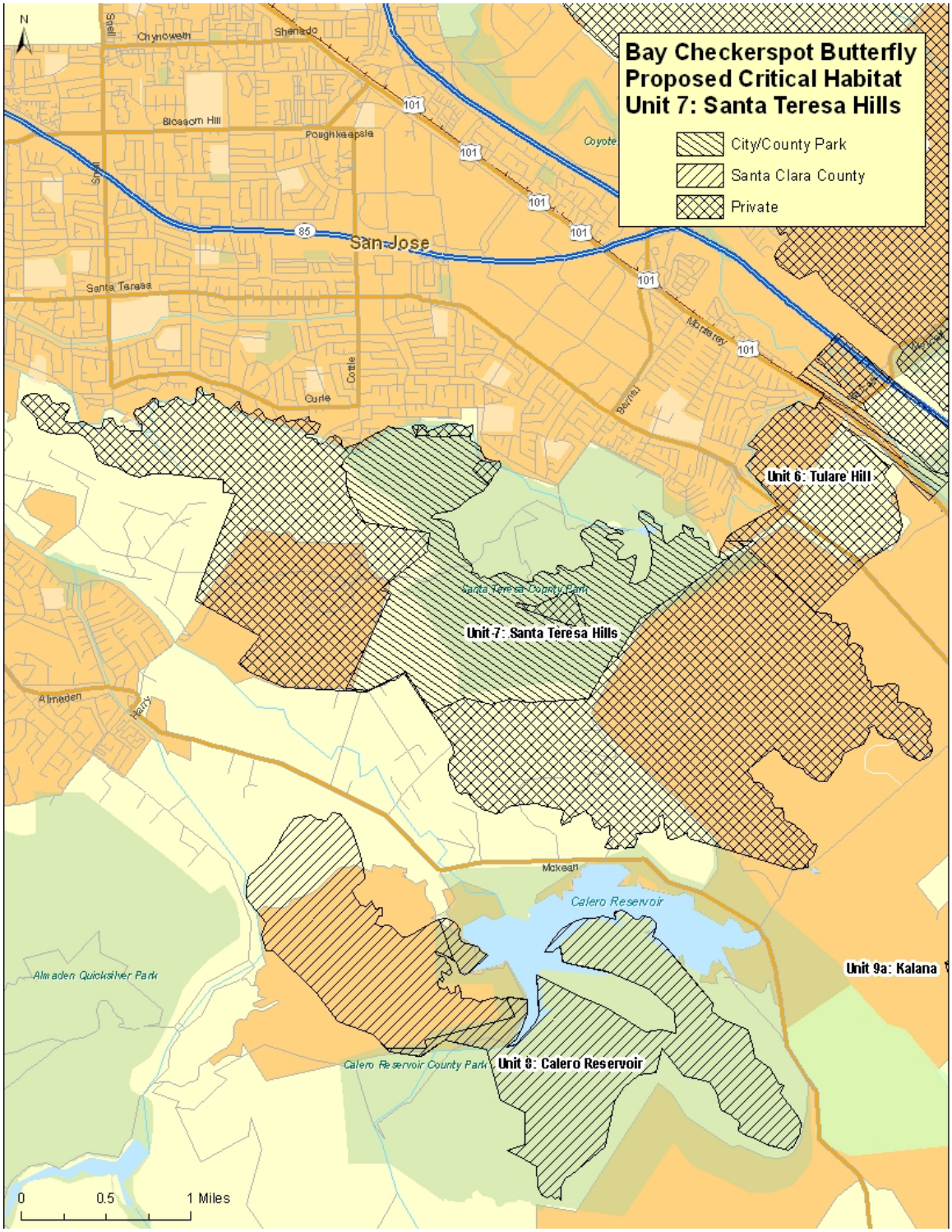


Figure ES-9: Ownership in Unit 8

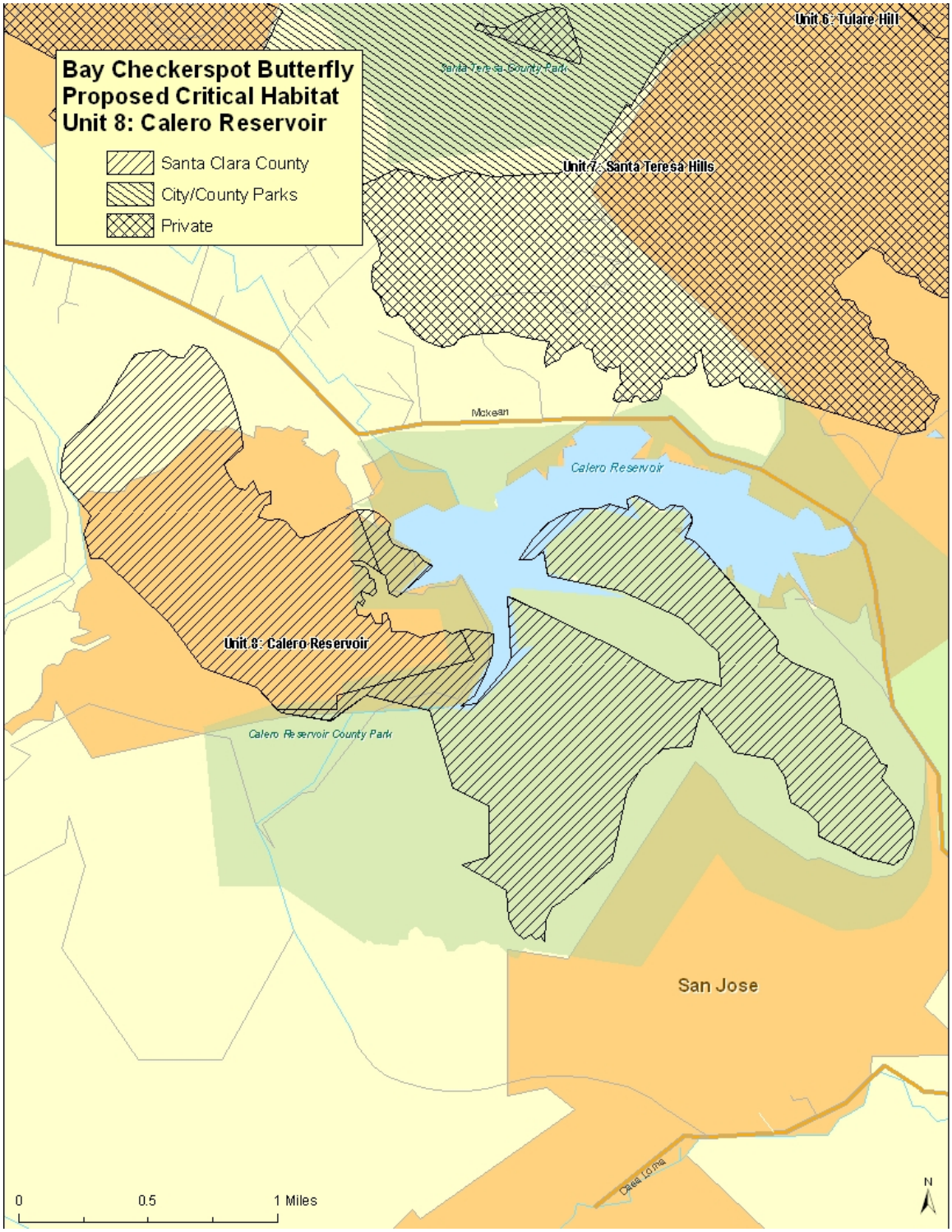


Figure ES-10: Ownership in Unit 9

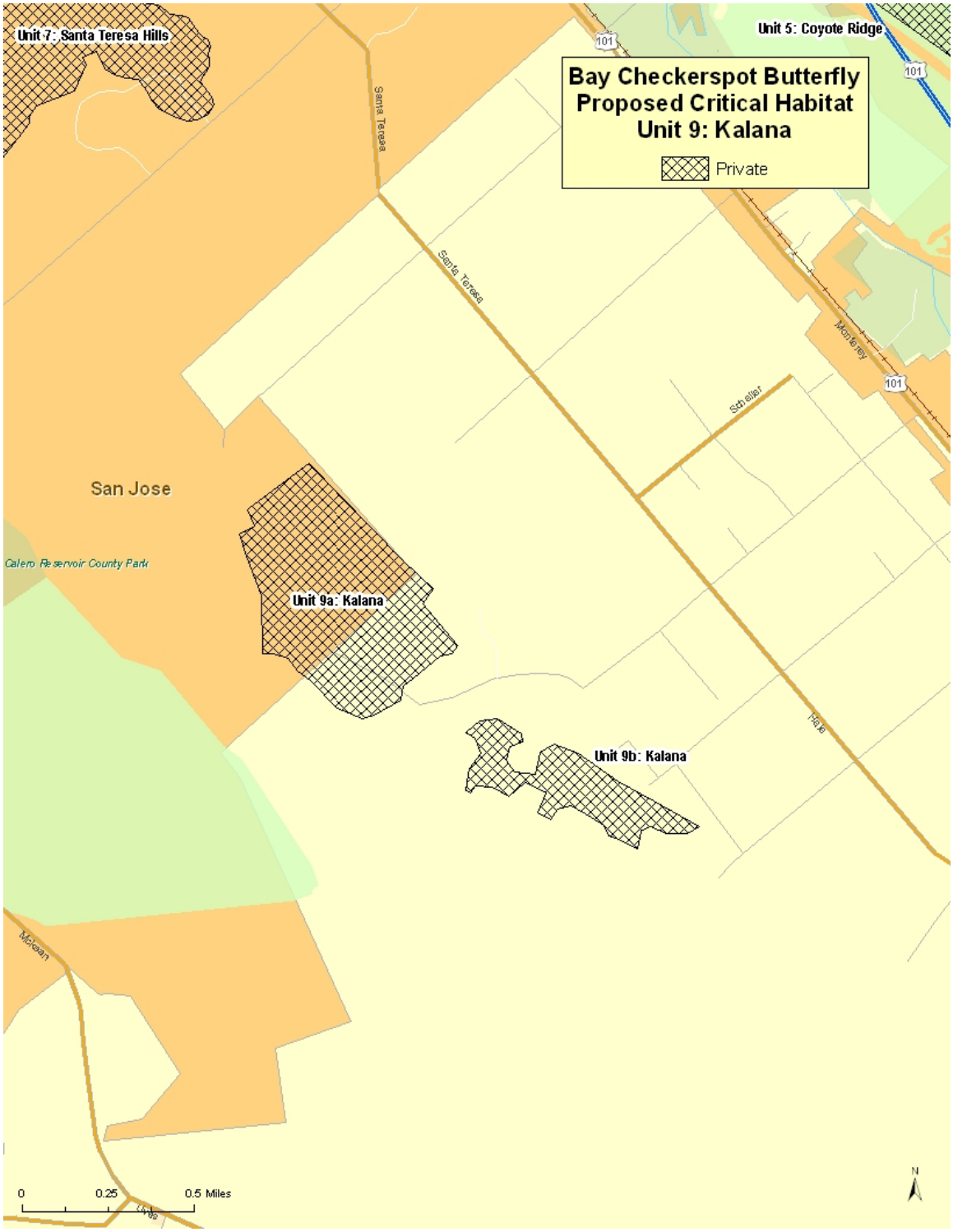


Figure ES-11: Ownership in Unit 10

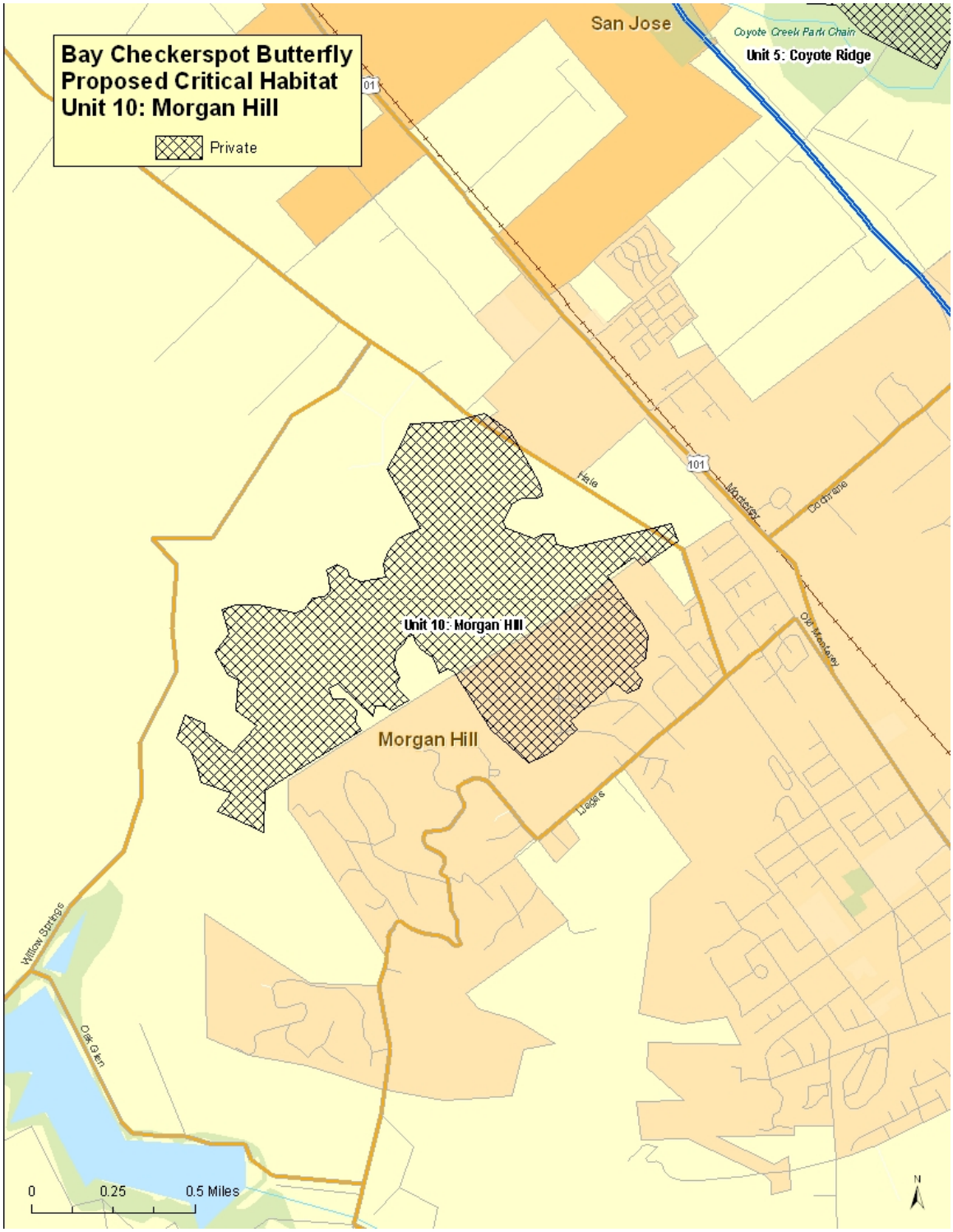


Figure ES-12: Ownership in Unit 11

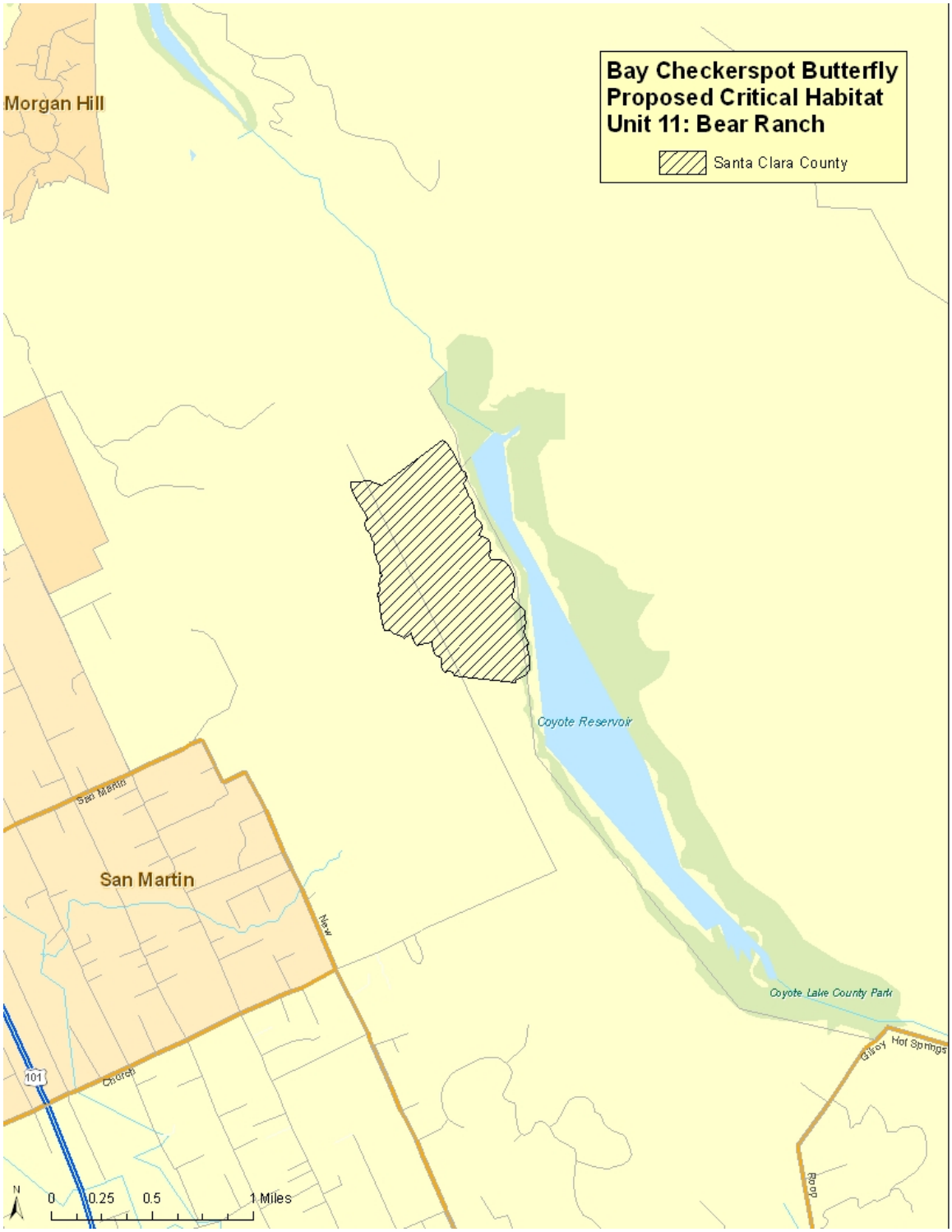
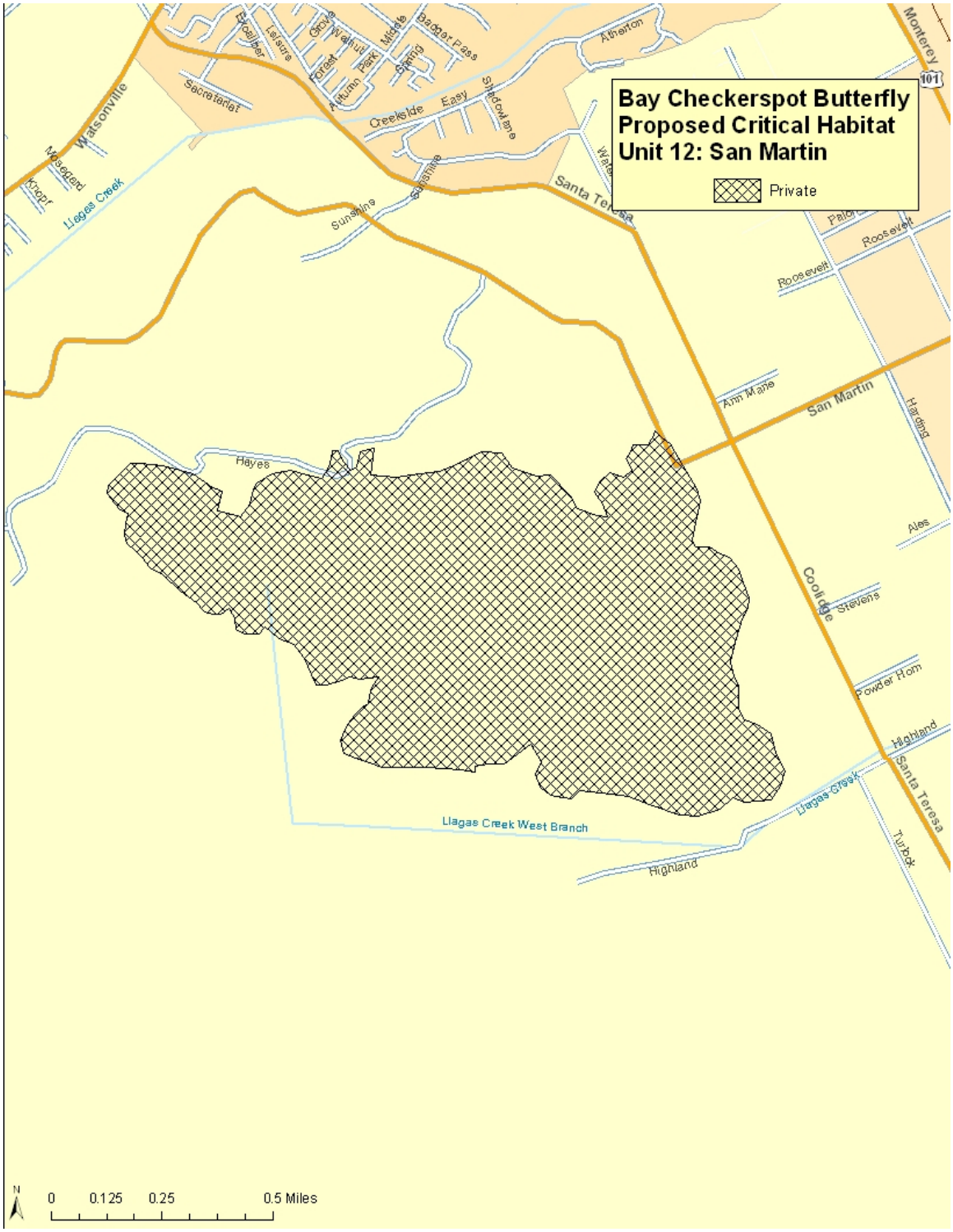


Figure ES-13: Ownership in Unit 12



Section 1

Framework and Background

1.1. Framework for the Analysis

The purpose of this report is to estimate the economic impact of actions taken to protect the federally-listed Bay Checkerspot Butterfly (*Euphydryas editha bayensis*) (hereafter, "the butterfly") and its habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas considered for critical habitat designation. This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections already accorded the butterfly; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the butterfly. The analysis looks retrospectively at baseline impacts incurred since the species was listed, and forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.

This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[5] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[6]

This section describes the framework for the analysis. First, it describes the case law that led to the selection of the framework applied in this report. It then describes in economic terms the general categories of economic effects that are the focus of regulatory impact analysis, including a discussion of both efficiency and distributional effects. Next, this section defines the analytic framework used to measure these impacts in the context of critical habitat regulation, including the link between existing and critical habitat-related protection efforts and potential impacts, and the consideration of benefits. It concludes with a presentation of the information sources relied upon in the analysis and the structure of the report.

1.1.1. Background

The U.S. Office of Management and Budget's (OMB) guidelines for conducting economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way

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[5] 16 U.S.C. §1533(b)(2).

[6] Executive Order 12866, Regulatory Planning and Review, September 30, 1993 (as amended by Executive Order 13258 (2002) and Executive Order 13422 (2007)); Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5. U.S.C. "601 et seq; and Pub Law No. 104-121.

the world would look absent the proposed action."[7] In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service's proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

In 2001, the U.S. Tenth Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable coextensively to other causes.[8] Specifically, the court stated,

> "The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation's definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation…Because economic analysis done using the FWS's baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the FWS conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the ESA."[9]

Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.[10] For example, in the March 2006 court order ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

> "The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance v. U.S. Dep't of the Interior*, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service's baseline approach and the court held that the baseline approach was both consistent with the language

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[7] OMB, "Circular A-4," September 17, 2003.

[8] *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

[9] *New Mexico Cattle GrowersAssn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

[10] *Cape Hatteras Access Preservation Alliance v. Department of Interior*, 344 F. Supp. 2d 108 (D.D.C.); CBD v. BLM, 422 F. Supp/. 2d 1115 (N.D. Cal. 2006).

and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. 'To find the true cost of a designation, the world with the designation must be compared to the world without it.'"[11]

In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis reports both:

a. the baseline impacts of butterfly conservation from protections afforded the species absent critical habitat designation; and

b. the estimated incremental impacts precipitated specifically by the designation of critical habitat for the species.

Summed, these two types of impacts comprise the fully co-extensive impacts of butterfly conservation in areas considered for critical habitat designation.

Incremental effects of critical habitat designation are determined using the Service's December 9, 2004 interim guidance on "Application of the 'Destruction or Adverse Modification' Standard Under Section 7(a)(2) of the Endangered Species Act" and information from the Service regarding what potential consultations and project modifications may be imposed as a result of critical habitat designation over and above those associated with the listing.[12] Specifically, in *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, the Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat, and the Service no longer relies on this regulatory definition when analyzing whether an action is likely to destroy or adversely modify critical habitat.[13] Under the statutory provisions of the Act, the Service determines destruction or adverse modification on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would remain functional to serve its intended conservation role for the species. A detailed description of the methodology used to define baseline and incremental impacts is provided later in this section.

1.1.2. Categories of Potential Economic Effects of Species Conservation

This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the butterfly and its habitat (hereinafter referred to collectively as "butterfly conservation efforts"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if the set of activities that may

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[11] *Center for Biological Diversity et al, Plaintiffs, v. Bureau of Land Management et. al, Defendants and American Sand Association, et al, Defendant Intervenors*. Order re: Cross Motions for Summary Judgment. Case 3:03-cv-02509 Document 174 Filed 03/14/2006. Pages 44-45.

[12] Director, U.S. Fish and Wildlife Service, Memorandum to Regional Directors and Manager of the California-Nevada Operations Office, Subject: Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act, dated December 9, 2004.

[13] *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, No. 03-35279 (9th Circuit 2004).

take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of butterfly conservation efforts.

This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a relatively small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The differences between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.2.1. Efficiency Effects

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect butterfly habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[14]

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager’s time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

[14] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/ webpages/Guidelines.html.

Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, protection measures that reduce or preclude the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

This analysis begins by measuring impacts associated with efforts undertaken to protect the butterfly and its habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and / or producer surplus in affected markets.

1.1.2.2. Distributional and Regional Economic Effects

Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[15] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities and Energy Supply, Distribution, and Use

This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future species conservation efforts.[16] In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.[17]

Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input / output models. These models rely on multipliers that

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[15] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

[16] 5 U.S.C. §§601 et seq.

[17] Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

The use of regional input / output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

1.1.3. Analytic Framework and Scope of the Analysis

This analysis identifies those economic activities most likely to threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid or minimize such threats within the boundaries of the study area. This section provides a description of the methodology used to separately identify baseline impacts and incremental impacts stemming from the proposed designation of critical habitat for the butterfly. This evaluation of impacts in a “with critical habitat designation” versus a “without critical habitat designation” framework effectively measures the net change in economic activity associated with the proposed rulemaking.

1.1.3.1. Identifying Baseline Impacts

The baseline for this analysis is the existing state of regulation, prior to the designation of critical habitat, that provides protection to the species under the Act, as well as under other Federal, State and local laws and guidelines. The “without critical habitat designation” scenario, which represents the baseline for this analysis, considers a wide range of additional factors beyond the compliance costs of regulations that provide protection to the listed species. As recommended by OMB, the baseline incorporates, as appropriate, trends in market conditions, implementation of other regulations and policies by the Service and other government entities, and trends in other factors that have the potential to affect economic costs and benefits, such as the rate of regional economic growth in potentially affected industries.

Baseline impacts include sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species.

- Section 7 of the Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. The portion of the administrative costs of consultations under the jeopardy standard, along with the impacts of project modifications resulting from consideration of this standard, are considered baseline impacts. Baseline administrative costs of section 7 consultation are summarized later in Table 1-1.
- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[18] The economic impacts associated with this section manifest themselves in sections 7 and 10.
- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a listed animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[19] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately avoided or minimized. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

Enforcement actions taken in response to violations of the Act are not included in this analysis.

In the case of the butterfly, critical habitat was previously designated in 2001.[20] The impacts of historical efforts to conserve critical habitat are assigned to the baseline, as these costs have already been incurred and therefore are unaffected by the proposed rule. In the future, the analysis assumes that the existing critical habitat is no longer in place as it has been revised by the new designation. To the extent that the study area for this analysis overlaps with the formerly designated habitat, future impacts attributable solely to critical habitat designation are attributed to the proposed rule currently under consideration.

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[18] 16 U.S.C. 1532.

[19] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at http://endangered.fws.gov/hcp/.

[20] 66 FR 21450.

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. If compliance with the Clean Water Act or State environmental quality laws, for example, protects habitat for the species, such protective efforts are considered to be baseline protections and costs associated with these efforts are categorized accordingly. Of note, however, is that such efforts may not be considered baseline in the case that they would not have been triggered absent the designation of critical habitat. In these cases, they are considered incremental impacts and are discussed below.

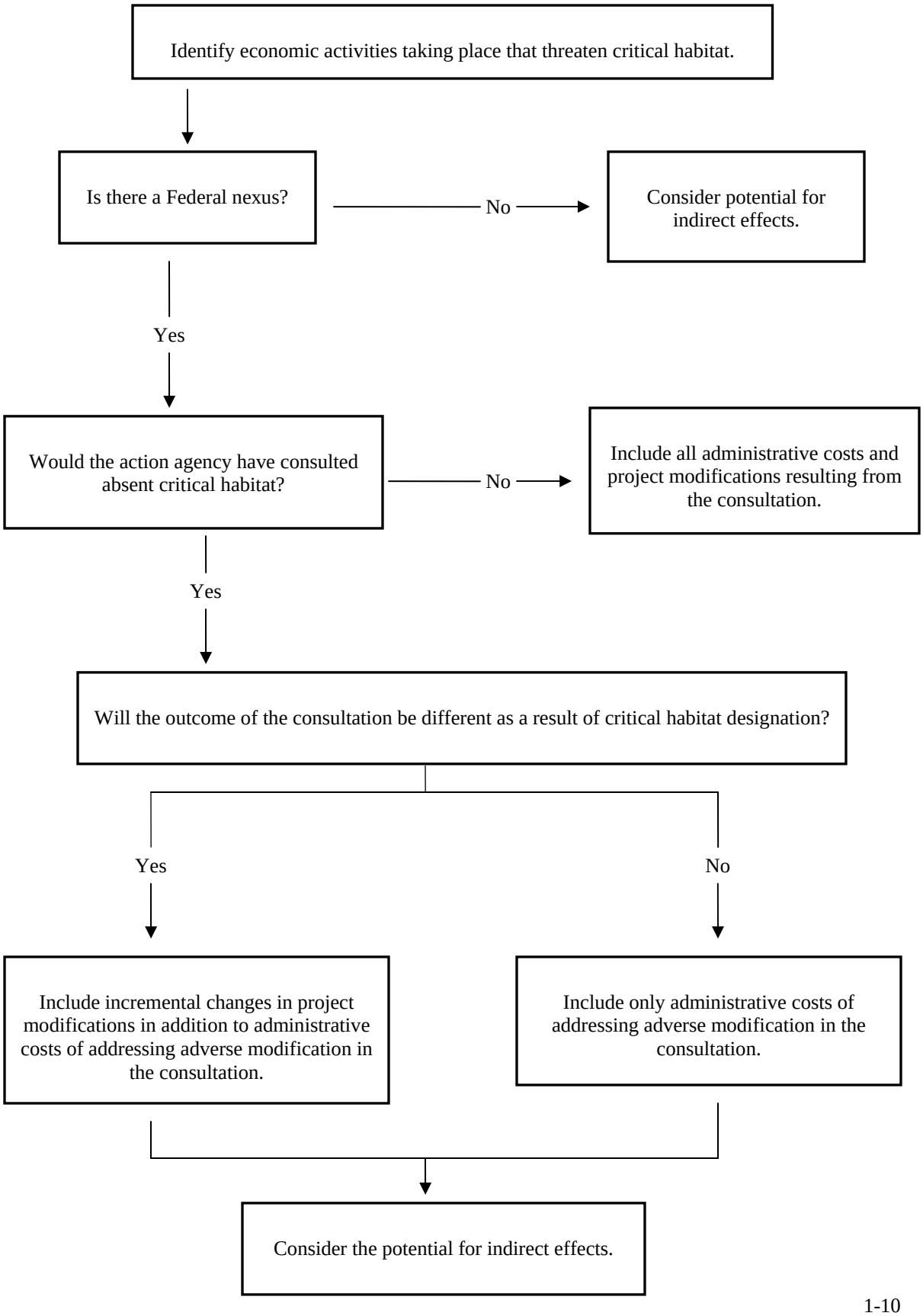
1.1.3.2. Identifying Incremental Impacts

This analysis separately quantifies the incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts due to existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.

When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing project modifications resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline, and are considered incremental impacts of the rulemaking.

Figure 1-1 depicts the decision analysis regarding whether an impact should be considered incremental. The following sections describe this decision tree in detail.

Figure 1-1: Identifying Incremental Impacts of Critical Habitat Designation



Incremental impacts may be the direct compliance costs associated with additional effort for forecast consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional project modifications that would not have been required under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., developing habitat conservation plans (HCPs) in an effort to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptional effects on markets.

Direct Impacts

The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2) implementation of any project modifications requested by the Service through section 7 consultation to avoid or minimize potential destruction or adverse modification of critical habitat.

Administrative Section 7 Consultation Costs

Parties involved in section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action agency (i.e., the Federal nexus necessitating the consultation) serves as the liaison with the Service. While consultations are required for activities that involve a Federal nexus and may jeopardize the continued existence of the species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.

In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

- **Additional effort to address adverse modification in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
- **Re-initiation of consultation to address adverse modification -** Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.
- **Incremental consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new

information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation.

The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation as it may not be possible to predict the outcome of each future consultation in terms of level of effort. Review of consultation records and discussions with Service field offices resulted in the estimated range of administrative costs of consultation employed in this analysis.

Table 1-1 provides estimated consultation costs representing effort required for all types of consultation, including those that considered both adverse modification and jeopardy. To estimate the fractions of the total administrative consultation costs that are baseline and incremental, the following assumptions were applied.

- The costs of a consultation that only considers jeopardy or only adverse modification (i.e., an incremental consultation only occurring because of the designation of critical habitat) are attributed wholly to the baseline or to critical habitat, respectively.
- Incremental costs of the re-initiation of a consultation because of the critical habitat designation are assumed to be approximately half the cost of the original consultation that considered only jeopardy. This assumes that re-initiations are less time-consuming as the groundwork for the project has already been considered in terms of its effect on the species.
- Efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review and report writing), and therefore incremental administrative costs of considering adverse modification in consultations that will already be required to consider jeopardy result in the least incremental effort of these three consultation categories, roughly half that of a re-initiation.

Importantly, the estimated costs represent the midpoint of a potential range of impacts to account for variability regarding levels of effort of specific consultations.

Table 1-1: Administrative Costs of Consultation ($2008)

Baseline Costs

Consultation Type	Service	Federal Agency	Third Party	Biological Assessment	Total costs
Consultation Considering only Jeopardy (no consideration of critical habitat designation)					
Technical Assistance	$546	n/a	$1,082	n/a	$1,545
Informal	$2,369	$2,987	$2,112	$2,060	$9,785
Formal	$5,305	$5,974	$3,605	$4,944	$20,085
Programmatic	$15,965	$13,390	n/a	$5,768	$35,123
Effort to Address Jeopardy in a New Consultation that Considers both Jeopardy and Adverse Modification					
Technical Assistance	$410	n/a	$812	n/a	$1,164
Informal	$1,782	$2,245	$1,586	$1,545	$7,344
Formal	$3,976	$4,481	$2,709	$3,708	$15,038
Programmatic	$11,948	$10,001	n/a	$4,326	$26,265

Incremental Costs

Consultation Type	Service	Federal Agency	Third Party	Biological Assessment	Total Costs
Incremental Consultation Resulting Entirely from Critical Habitat Designation					
Technical Assistance	$546	n/a	$1,082	n/a	$1,545
Informal	$2,369	$2,987	$2,112	$2,060	$9,785
Formal	$5,305	$5,974	$3,605	$4,944	$20,085
Programmatic	$15,965	$13,390	n/a	$5,768	$35,123
Re-initiation of Consultation to Address Adverse Modification					
Technical Assistance	$273	n/a	$541	n/a	$773
Informal	$1,185	$1,494	$1,061	$1,030	$4,893
Formal	$2,657	$2,987	$1,803	$2,472	$10,043
Programmatic	$7,983	$6,674	n/a	$2,884	$17,510
Additional Effort to Address Adverse Modification in a New Consultation					
Technical Assistance	$137	n/a	$271	n/a	$386
Informal	$592	$747	$528	$515	$2,451
Formal	$1,329	$1,494	$901	$1,236	$5,026
Programmatic	$3,996	$3,337	n/a	$1,442	$8,765

Notes:

(1) Totals may not sum due to rounding.

(2) Estimates reflect average hourly time required by staff.

Source: IEc analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2007, and a review of consultation records from several Service field offices across the country conducted in 2002.

Section 7 Project Modification Impacts

Section 7 consultation considering critical habitat may also result in additional project modification recommendations specifically addressing potential destruction or adverse modification of critical habitat. For forecast consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of project modifications undertaken to avoid or minimize adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated project modifications are assumed to be incremental impacts of the designation. This is summarized below.

- **Additional effort to address adverse modification in a new consultation -** Only project modifications associated solely with avoiding or minimizing adverse modification are considered incremental.
- **Re-initiation of consultation to address adverse modification -** Only project modifications associated solely with avoiding or minimizing adverse modification are considered incremental.
- **Incremental consultation resulting entirely from critical habitat designation -** Impacts of all project modifications are considered incremental.

Indirect Impacts

The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the Act. Indirect impacts are those unintended changes to economic behavior that may occur outside of the Act, through other Federal, State, or local actions, that are caused by the designation of critical habitat. This section identifies common types of indirect impacts that may be associated with the designation of critical habitat. Importantly, these types of impacts are not always considered incremental. In the case that these types of conservation efforts and economic effects are expected to occur regardless of critical habitat designation, they are appropriately considered baseline impacts in this analysis.

Habitat Conservation Plans

Under section 10 of the Act, landowners seeking an incidental take permit must develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately avoided or minimized. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act.

Application for an incidental take permit and completion of an HCP is not required or necessarily recommended by a critical habitat designation. However, in certain situations the new information provided by the proposed critical habitat rule may prompt a landowner to apply for an incidental take permit. For example, a landowner may have been previously unaware of the potential presence of the species on his or her property, and expeditious completion of an HCP may offer the landowner regulatory relief in the form of exclusion from the final critical habitat designation. In this case, the effort

involved in creating the HCP and undertaking associated conservation actions are considered an incremental effect of the designation.

Other State and Local Laws

Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.

The California Environmental Quality Act (CEQA), for example, requires that lead agencies, public agencies responsible for project approval, consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. In some instances, critical habitat designation may trigger CEQA-related requirements. This is most likely to occur in areas where the critical habitat designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were "categorically exempt" from preparing an Environmental Impact Report under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, associated impacts are considered to be an indirect, incremental effect of the designation.

Additional Indirect Impacts

In addition to the indirect effects of compliance with other laws or triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts, including the following:

- **Time Delays -** Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and / or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.
- **Regulatory Uncertainty -** The Service conducts each section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. Where information suggests that this type of regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation.
- **Stigma -** In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated project modifications and regulatory uncertainty

described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to property owners, regardless of whether such limits are actually imposed. All else equal, a property that is designated as critical habitat may have a lower market value than an identical property that is not within the boundaries of critical habitat due to perceived limitations or restrictions. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. To the extent that potential stigma effects on markets are probable and identifiable, these impacts are considered indirect, incremental impacts of the designation.

1.1.3.3. Benefits

Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[21] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[22]

In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.[23] *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

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[21] Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

[22] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

[23] *Ibid.*

It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if habitat preserves are created to protect a species, the value of existing residential property adjacent to those preserves may increase, resulting in a measurable positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

1.1.3.4. Geographic Scope of the Analysis

The geographic scope of the analysis includes all areas identified as critical habitat, including the areas proposed for exclusion from the final designation. Collectively, these areas are referred to as the "study area" for the purposes of this analysis. Although the entire study area is analyzed, emphasis is placed on understanding impacts in areas proposed for final designation. Note that economic activities affecting critical habitat may by sited outside of the boundaries of the study area (e.g., upstream activities); these activities are considered relevant to this analysis. The results of the analysis, as summarized in the Executive Summary, are aggregated by proposed critical habitat unit and entity.

1.1.3.5. Analytic Time Frame

The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 1987 (year of the species' final listing) to 2030. Estimated impacts are divided into pre-designation (1987-2007) and post-designation (2008-2030) impacts.[24] The land uses within the study area are not expected to substantially change over this time period.

Information is available to reliably forecast economic activity to 2030. Land value impacts associated with restrictions on development are calculated assuming all future use of the land for housing is precluded. While the decreased land value is calculated assuming the services provided by those lands are lost in perpetuity, the resulting estimate reflects an impact on land value that is expected to be experienced at the time the rule is made final. It is therefore an impact that is assumed to be experienced within the 23 year time frame.

[24] As described in the Proposed Rule, the Service first designated critical habitat for this species in 2001 (66 FR 21450). "Pre-designation" and "post-designation" in this report refer to the revised final critical habitat designation expected in 2008.

1.1.4. Alternate Discount Rates

This analysis uses a three percent discount rate to present economic impacts incurred in different time periods in present value terms. To discount and annualize costs, guidance provided by OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference.[25] Appendix D of this report compares impacts in undiscounted dollars and present value terms using a seven percent discount rate.

1.1.5. Information Sources

The primary sources of information for this report were communications with and data provided by personnel from the Service, Federal agencies, California State governments and institutions, local government agencies in San Mateo and Santa Clara Counties, and affected private entities. In addition, this analysis relies upon the Service's section 7 consultation records and existing or planned habitat management and conservation plans that consider the butterfly.

1.1.6. Structure of the Report

The remainder of the report is organized as follows:

- Section 2: Baseline Impacts;
- Section 3: Incremental Impacts;
- Appendix A: Areas Proposed for Exclusion from Critical Habitat According to Section 4(b)(2) of the Act;
- Appendix B: Past Costs Related to Consultation;
- Appendix C: SBREFA Screening Analysis and Impacts to the Energy Industry;
- Appendix D: Present Value and Alternative Discount Rates; and
- Appendix E: Technical Information for Impacts on Urban Development.

1.2. Background

This section summarizes the study area and provides information on the land use activities considered in this analysis. The butterfly is a member of the checkerspots and crescents brush-footed butterflies: one of about 20 subspecies of *Euphydryas editha*. The subspecies occurs primarily on serpentine soils with appropriate physical and vegetative characteristics in San Mateo and Santa Clara Counties, California. The Proposed Rule describes the species and its habitat in detail.[26]

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[25] U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.

[26] 72 FR 48178, Proposed Rule.

1.2.1. Regulatory History

On September 18, 1987, the Service published the final rule listing the butterfly as endangered.[27] Following that on September 30, 1998 the Service published a recovery plan for Serpentine Soil Species of the San Francisco Bay Area that included the Bay Checkerspot Butterfly.[28] The designation of 23,903 acres in San Mateo and Santa Clara Counties of critical habitat for the butterfly was published in the Federal Register on April 30, 2001.[29] On March 30, 2005, the Home Builders Association of Northern California filed suit against the Service challenging critical habitat for the butterfly and other species. On February 24, 2006, a settlement agreement was reached that required the Service to reevaluate the final critical habitat rule. The settlement stipulated that any proposed revisions to the Bay Checkerspot Butterfly critical habitat designation must be submitted to the Federal Register for publication on or before August 14, 2007.[30]

1.2.2. Proposed Critical Habitat Designation

The proposed critical habitat rule for the butterfly delineates twelve units across San Mateo and Santa Clara Counties, California in terms of areas proposed for final critical habitat and areas proposed for exclusion from critical habitat according to section 4(b)(2) of the Act, collectively referred to as the "study area." Areas proposed for exclusion from critical habitat are covered by the San Bruno Mountain Habitat Conservation Plan as amended.[31] Three of the proposed units (1, 2, and 4) are currently unoccupied. Information on these units, the areas proposed for critical habitat and exclusion, and the landowners and managers is presented in Table 1-2 and in Figures ES-1 through ES-13.

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[27] 52 FR 35366, Listing Rule.

[28] US FWS, Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area, Portland, Oregon, 330+ pp.

[29] 72 FR 48180, Final Rule.

[30] 72 FR 48180, Proposed Rule.

[31] 72 FR 48185, Proposed Rule.

Table 1-2: Proposed Critical Habitat and Proposed Exclusion for the Bay Checkerspot Butterfly

Unit	Name	Ownership / Management	Land Use Description	Critical Habitat (Acres)	Exclusion (Acres)	Total (Acres)
1	San Bruno Mt.	Private	Part of the San Bruno Mountain HCP		198	775
		San Mateo County			552	
		CDFG			25	
2	Pulgas Ridge	SFPUC	Peninsula Watershed	179		179
3	Edgewood Park	City/County Parks	A San Mateo County Park	303		409
		SFPUC	Peninsula Watershed	66		
		Private	Developable	40		
4	Jasper Ridge	Stanford University	Jasper Ridge Biological Preserve	329		329
5	Coyote Ridge	Santa Clara Co. DPR	Off-road vehicle recreation	110		10,148
		Private	Under protection or management	291		
		Private	WMI butterfly preserve (not permanently protected)	250		
		Private	William Lyon Homes butterfly preserve	473		
		Private	Developable	9,024		
6	Tulare Hill	City/County Parks	Parts of Coyote Creek Park, Metcalf Park, and Santa Teresa County Park	102		747
		Private	Land Trust for Santa Clara County conservation easement	114		
		Private	Developable	531		
7	Santa Teresa Hills	City/County Parks	Unknown	1,100		3,988
		Private	Developable	2,888		
8	Calero Reservoir	Santa Clara Co. DPR	Calero County Park	637		1,543
		SCVWD	Unknown	906		
9	Kalana Hills 9A	Private	Developable	170		226
	Kalana Hills 9B	Private	Developable	56		
10	Morgan Hill	Private	Developable	507		507
11	Bear Ranch	City/County Parks	Coyote Lake-Harvey Bear Ranch County Park	393		393
12	San Martin	Private	Cordevalle Valley Golf Club	298		502
		Private	Developable	204		
Subtotals:		*County*		*2,645*	*552*	
		State			*25*	
		Local		*1,151*		
		Private, Protected		*1,505*	*198*	
		Private, Developable		*13,670*		
Total				**18,971**	**775**	**19,746**

Notes: All areas shown in acres. CDFG = California Department of Fish and Game; SFPUC = San Francisco Public Utilities Commission; Santa Clara Co. DPR = Santa Clara County Dep't of Parks and Recreation; WMI=Waste Management, Inc.; SCVWD=Santa Clara Valley Water District.

Sources: Ownership GIS data received from Service August 31, 2007; Proposed Rule 72 FR 48187-90.

1.2.3. Regulatory Alternatives

Executive Order 12866 directs Federal Agencies to evaluate regulatory alternatives. The Service proposes as critical habitat 19,746 acres in the study area, including the 755 acres proposed for exclusion from the final critical habitat designation. An alternative to the proposed rule is the designation of all 19,746 acres, and the potential impacts of all are estimated in this report. In addition, section 4(b)(2) of the Act allows the Service to exclude additional areas proposed for designation based on economic and other relevant impacts. Consideration of impacts at a unit level may result in alternate combinations of potential habitat that may or may not ultimately be designated as critical habitat. As a result, the impacts of multiple combinations of potential habitat are also available to the Service.

1.2.4. Threats to the Bay Checkerspot Butterfly and its Habitat

Review of the Proposed Rule, Recovery Plan, and a representative sample of the consultation history identifies the following activities as potential conservation threats to the butterfly and its habitat:

- Urban and Suburban Growth;
- Invasion of Nonnative Plants from Air Pollution (Primarily Nitrogen);
- Pesticide Use;
- Wildfires;
- Over and Under Grazing;
- Gopher Control; and
- Vehicular Air Strikes.[32]

Whereas this analysis considers the impacts to urban development, pesticide application, invasion of nonnative plants caused by nitrogen deposition, it does not anticipate economic impacts from over and under grazing, controlling wildfires, reducing gopher control, or managing vehicular air strikes for the butterfly. Over and undergrazing is expected to be revenue neutral given the implementation of the SCVHCP / NCCP. The importance of this activity and its associated negligible impacts are discussed in further detail in Section 2. Wildfire prevention has occurred and will continue to occur in Santa Clara and San Mateo Counties to comply with various County and State requirements.[33] Although wildfire prevention aids in the conservation of the butterfly, it is unreasonable to attribute the costs of wildfire prevention to the butterfly's presence. The Service

[32] 72 FR 48183-84, Proposed Rule.

[33] Electronic communication from Arnold Roessler, Listing Program Coordinator at the Sacramento Fish and Wildlife Office, September 11, 2007.

proposes to treat gopher control by spreading information to relevant entities through pamphlets, brochures, and other educational handouts at a negligible cost.[34]

In past consultation on development projects, the Service has regulated vehicular air strikes by imposing daytime speed limits during the butterflies' flight season.[35] The speed limit did not have a significant impact on travel time because it was for a limited time period on a short stretch of residential road where the speed limit was already relatively low. This analysis assumes future consultations that impose speed limits will not have a significant impact on travel time because they are likely to also be of limited duration and located in residential areas. The economic impacts of regulating wildfires, gopher control and vehicular air strikes will not be further considered in the economic analysis.

The remainder of this report describes incremental and baseline butterfly conservation efforts associated with urban development, pesticide application, invasion of nonnative plants from air pollution, and over and under grazing. It also considers the impacts of additional conservation efforts for the butterfly that are not directly related to a specific threat.

[34] Personal communication from Arnold Roessler, Listing Program Coordinator at the Sacramento Fish and Wildlife Office, September 6, 2007.

[35] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, "Formal Consultation on Nationwide Permit Modification for the Ranch on Silver Creek (Cerro Plata) Development, San Jose, Santa Clara County, California, on October 12, 2000.

Section 2

Baseline Impacts

This section of the report assesses baseline impacts associated with urban development, pesticide application, invasion of nonnative plants caused by nitrogen deposition, and over and under grazing. Additionally, it includes in the baseline other on-going management activities done to conserve the butterfly that are unrelated to these four specific threats. Baseline impacts are those impacts that result from listing and other overlapping protection efforts, including those efforts that might benefit other species at the same time. In other words, the impacts described in this section are expected to occur regardless of the designation of critical habitat.

2.1. Urban Development

Portions of the study area may require special management due to habitat fragmentation and loss resulting from urban and suburban growth. This section of the report summarizes the possible baseline effects of butterfly conservation efforts on urban development in Santa Clara and San Mateo Counties. The analysis quantifies the anticipated impacts from the Santa Clara Valley Habitat Conservation Plan / Natural Community Conservation Plan (SCVHCP / NCCP), which is expected to be implemented in 2009. The analysis also quantifies the potential impacts on urban development in San Mateo County that may result from section 7 consultation regarding the listing of the butterfly.

2.1.1. Santa Clara County

All critical habitat units in Santa Clara County will fall under the jurisdiction of the SCVHCP / NCCP. A regional partnership was formed in 2005 between six local agencies, three wildlife agencies, and the National Marines Fisheries Service (referred to as "the partners") to draft the SCVHCP / NCCP. Development of a Habitat Conservation Plan was recommended during a section 7 consultation with the Service for the US Highway 101 widening, Bailey Avenue Extension / Highway 101 Interchange, US 85 / 101 South Interchange, and Coyote Valley Research Park projects. The area is not proposed for exclusion from critical habitat designation, as the plan is currently in a draft form and it is not scheduled to be completed until 2009. The agency or organization that will be responsible for fully implementing the SCVHCP / NCCP, referred to as the Implementing Entity, will be identified later in the planning process.

The partners are considering approximately 62 percent of the land area of Santa Clara County, or approximately 520,000 acres for inclusion in the Plan. The Plan covers primarily southern Santa Clara County and includes all of the City of San Jose except for Bayland areas, the City of Morgan Hill, and the City of Gilroy.[36] The impacts presented in this section of the economic analysis reflect only the conservation efforts under the SCVHCP / NCCP that occur within the area of proposed critical habitat for the butterfly.

The Plan covers 15 listed plant species and 15 listed wildlife species, including the butterfly. Although not all conservation efforts in the Plan are solely attributable to the butterfly, the butterfly is an important factor in developing the conditions of the SCVHCP / NCCP. All conservation efforts specified in the Plan that aid in the conservation of the butterfly are baseline impacts, even if they serve to benefit other species at the same time.

Efforts to Conserve the Butterfly

A primary purpose of the SCVHCP / NCCP is to maintain or improve the viability of existing butterfly populations, increase the number of populations, and expand the geographic distribution to ensure the long-term persistence of the butterfly in the study area. To that end, in the SCVHCP / NCCP, approximately 3,600 acres of butterfly habitat

[36] San Jose's Baylands were excluded from the HCP area to avoid covering species restricted to salt marshes and other saline habitats.

is proposed to be added to the Reserve System, increasing the proportion of protected habitat in the study area to about 76 percent. The Reserve System is all of the discrete areas, called Reserve Areas, of conserved habitats managed as single units under the SCVHCP / NCCP. There are currently approximately 7,700 acres of butterfly habitat within the proposed study area, approximately 2,300 acres (or about 30 percent) of which are within existing protected areas. The Implementing Entity will enable the protection of approximately 4,900 acres of serpentine grassland for the benefit of the butterfly through fee title acquisition or conservation easement. Protection of sites will be prioritized according to threat, patch size, current occupancy, and prevalence of cool microsites. The Implementing Entity will also oversee enhancement of degraded areas to benefit serpentine grasses and encourage growth of host plants and nectar sources for the butterfly.

The Reserve System was designed largely based on the butterfly's habitat, particularly for the serpentine grassland habitat type, since the butterfly's habitat can be used as an umbrella species for many serpentine plants. Because the study area supports almost all the known butterfly populations, a relatively high conservation target was set to protect the butterfly so that the SCVHCP / NCCP could contribute substantially to the species' recovery.[37]

Management of the serpentine grassland areas for the benefit of the butterfly is delineated in the SCVHCP / NCCP. General principles for grassland management will be followed in all serpentine grassland areas. Once land is protected and beneficially managed for the butterfly, it is assumed that individuals from persistent core populations will colonize new areas that provide necessary habitat characteristics. Time will be allowed for new populations to occur on new sites, but if site management is inadequate and natural dispersal is not occurring, targeted assisted migration may be used. In such an event, butterfly eggs, larvae, or adults will be translocated from core populations into suitable but unoccupied sites to reestablish populations.

Grazing and prescribed burning will be implemented in the Reserve Areas using adaptive management until best management practices for the butterfly can be developed. The sites will be managed using a variety of methods, and results will be tracked so that management programs can be modified over time. Management will focus primarily on sites with known core populations to ensure that those populations are not compromised by shifting management resources to other sites.

Budget estimates for the SCVHCP / NCCP are in the preliminary stage as land acquisition and management is currently being negotiated. Draft budget estimates are $45,000,000 to acquire 4,500 acres of serpentine soil habitat, which represent a midpoint of three land purchase scenarios.[38] As mentioned above, the butterfly is considered an umbrella species for serpentine soil species. Costs of land purchase and management are partially attributable to the butterfly, but also benefit other serpentine soil species. Of the

[37] Santa Clara Valley Preliminary Draft HCP / NCCP, available at http://www.scv-habitatplan.org/www/site/alias__default/documents_draft_hcp_chapters/292/draft_hcp_chapters.aspx, accessed on October 26, 2007.

[38] Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the Santa Clara Valley HCP/NCCP, on November 2, 2007.

4,500 acres of serpentine soil habitat proposed to be purchased for the SCVHCP / NCCP, 4,000 acres will be monitored for the butterfly. Management costs are estimated at $100 per acre per year, at a total annual management cost of $450,000 for serpentine soil habitat. Management costs include reserve management and maintenance; monitoring, research and adaptive maintenance; and program administration.[39]

Estimated economic impacts of operating the SCVHCP / NCCP in the butterfly proposed critical habitat are approximately $12 million, between the time of implementation in 2009 and 2030. The breakdown of costs for the different program areas is shown below. These estimates are subject to change in the future.

Table 2-1: Estimated Economic Impacts of Draft SCVHCP / NCCP

Budget Category	2009	2010-2014	2015-2019	2020-2024	2025-2029	2030
Program Administration	$33,000	$184,000	$180,000	$180,000	$180,000	$34,000
Land Acquisition	$0	$1,270,000	$1,250,000	$1,230,000	$1,210,000	$240,000
Habitat Restoration/ Creation	$360	$630,000	$640,000	$640,000	$640,000	$130,000
Environmental Compliance	$0	$26,000	$26,000	$26,000	$26,000	$5,300
Reserve Management and Maintenance	$4,900	$250,000	$320,000	$300,000	$340,000	$63,000
Water Supply & Fish Habitat Management	$0	$59,000	$59,000	$59,000	$59,000	$12,000
Recreation and Public Access	$1,400	$31,000	$36,000	$42,000	$48,000	$11,000
Monitoring, Research, and Adaptive Management	$430	$98,000	$99,000	$97,000	$98,000	$20,000
Remedial Measures	$140	$5,400	$6,600	$7,600	$8,300	$1,700
Contingency Fund	$59,000	$190,000	$190,000	$190,000	$200,000	$39,000
Total (each period)	**$99,000**	**$2,700,000**	**$2,800,000**	**$2,800,000**	**$2,800,000**	**$560,000**
Total Future	**$12,000,000**					

Notes:

(1) Per guidance from Jones and Stokes, land acquisition costs were adjusted to $2008 using the Home Price Index from the U.S. Office of Federal Housing Enterprise Oversight. All other costs were adjusted to $2008 dollars using the Consumer Price Index (CPI) for the San Francisco-Oakland-San Jose Metropolitan Service Area from the U.S. Bureau of Labor Statistics.

Source:

(1) SCVHCP / NCCP Budget Model from November 2007.

[39] *Ibid.*

Impacts of the Reserve System on Urban Development

The SCVHCP / NCCP includes a plan for a Reserve System which provides conservation of covered species within the study area and linkages to adjacent habitat outside the area covered by the SCVHCP / NCCP. The Reserve System will preserve between approximately 30,000 and 58,000 acres of land for the benefit of covered species, natural communities, biological diversity, and ecosystem function. There are seven activity categories covered by the SCVHCP / NCCP: urban development, in-stream capital projects, in-stream operations and maintenance, rural capital projects, rural operations and maintenance, rural residential development, and conservation strategy implementation. For these activities the SCVHCP / NCCP:

- Provides regional avoidance of covered species resulting from covered activities;
- Prevents take from covered activities as prohibited by law (e.g., take of fully protected species);
- Minimizes adverse effects on natural communities and covered species that occur in the Reserve System or outside the Reserve System in areas where some conservation actions will take place; and
- Avoids and minimizes regional impacts on jurisdictional wetlands and waters to facilitate project-by-project wetland permitting.

The SCVHCP / NCCP therefore will achieve regional avoidance and minimization by allowing covered activities to take place outside of the Reserve System and preserving the areas within the Reserve System. The aim is to conserve areas of high biological value and allow covered activities in low quality areas. The conditions to avoid and minimize effects from the covered activities are defined in terms of fees or purchasing mitigation land. At this time, a formula is not available for purchasing mitigation land. A fee structure has not yet been finalized. However, fee ranges that are currently under consideration range from $4,000 to $18,000 per acre of land developed. Therefore, this analysis assumes an average fee of $11,000 per acre of land developed. Land preservation in lieu of fees proposals will be evaluated on a case-by-case basis by the entity that implements the SCVHCP / NCCP. [40]

Identification of Lands to be Developed

To estimate the impacts of the SCVHCP / NCCP on urban development this analysis compares projected development patterns with and without the SCVHCP / NCCP. All areas that lie within the Reserve System will be avoided by development under the SCVHCP / NCCP and therefore no projected development will be allowed in these areas. The maps below show the areas of proposed critical habitat for the butterfly that are projected for development before and after the implementation of the SCVHCP / NCCP.

[40] Electronic communication with David Zippin, Principal of Jones and Stokes, consultant for the SCVHCP / NCCP, on January 18, 2008.

Figure 2-1

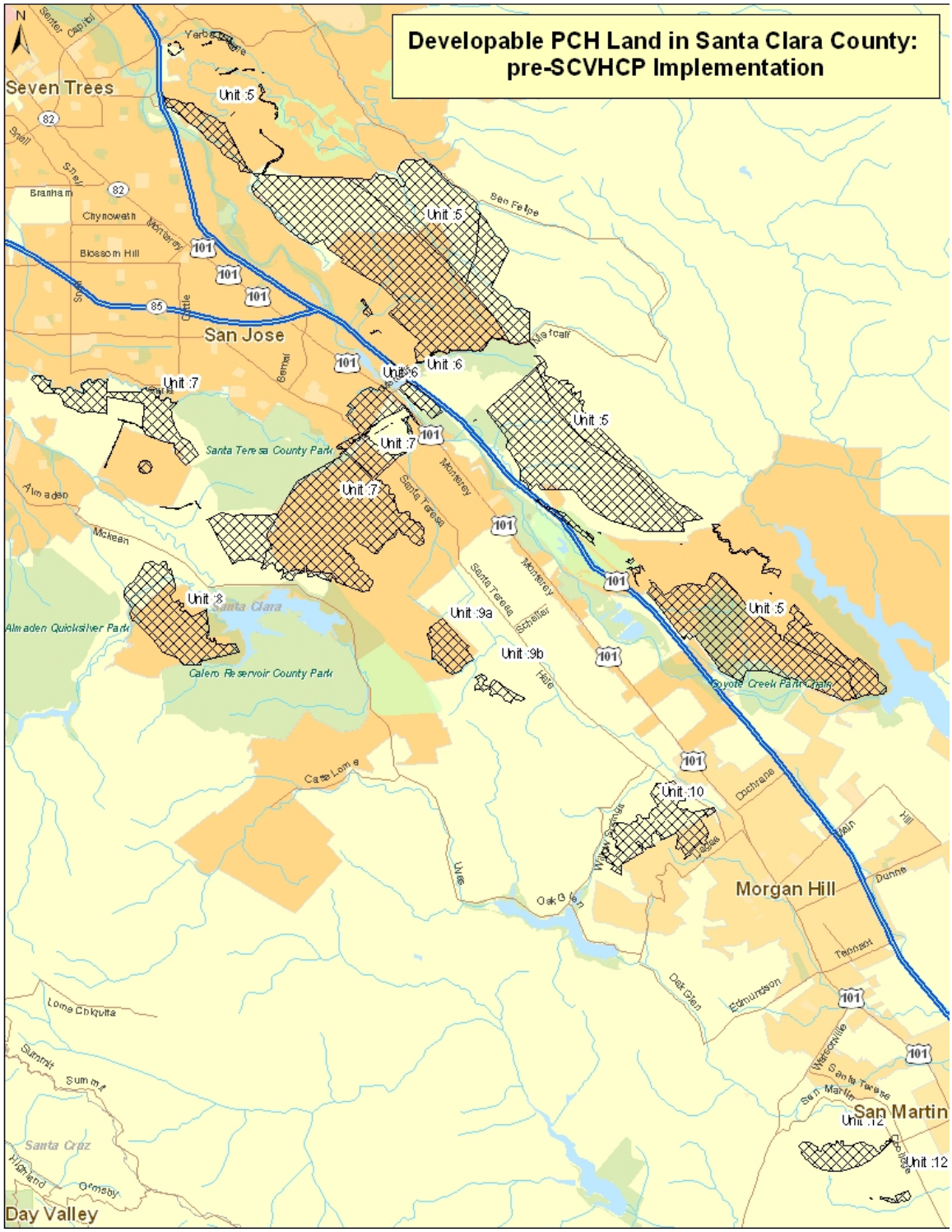
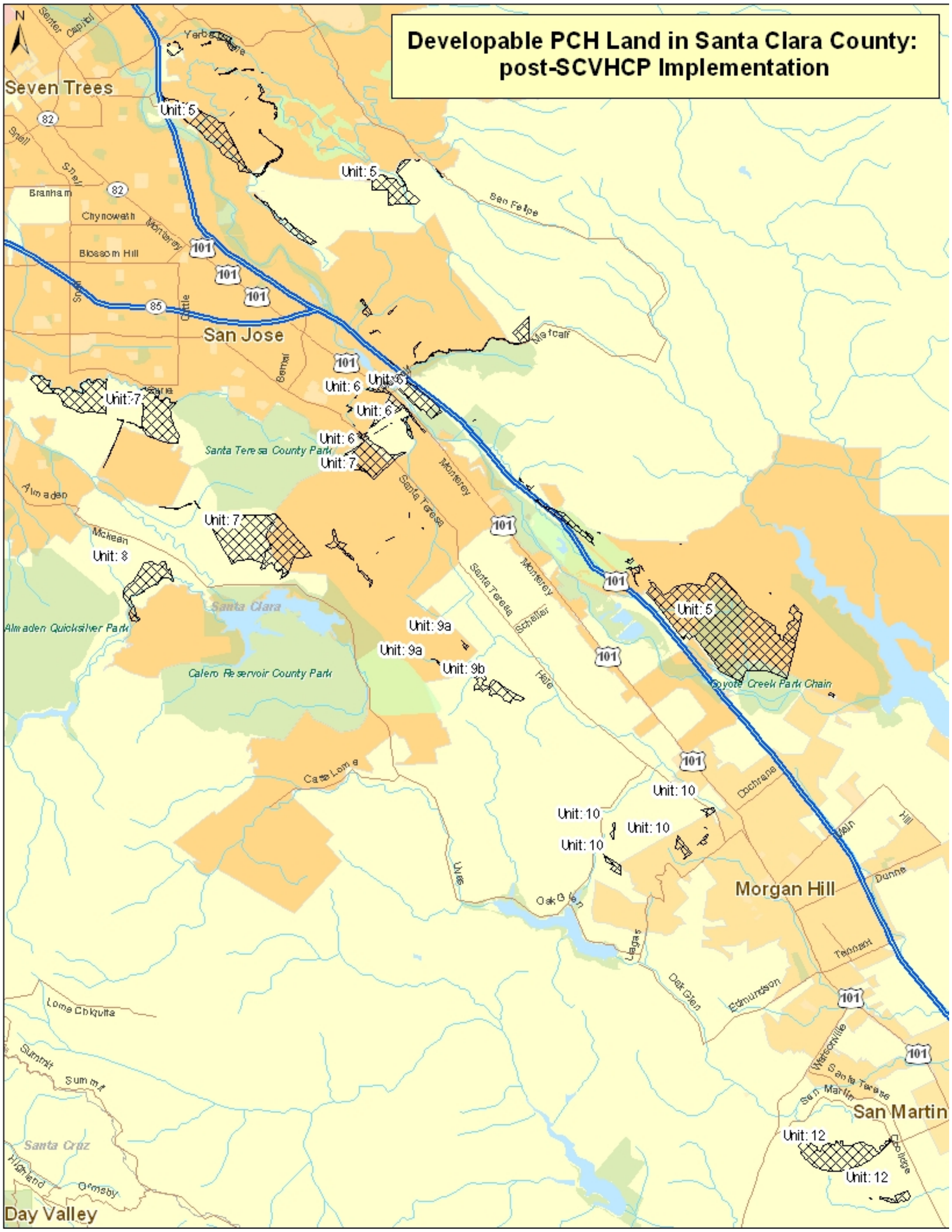

Developable PCH Land in Santa Clara County:
pre-SCVHCP Implementation
Seven Trees
San Jose
Morgan Hill
San Martin
Day Valley
Unit :5
Unit :6
Unit :7
Unit :8
Unit :9a
Unit :9b
Unit :10
Unit :12
Santa Teresa County Park
Almaden Quicksilver Park
Calero Reservoir County Park
Coyote Creek Park Chain

Figure 2-2


Developable PCH Land in Santa Clara County:
post-SCVHCP Implementation
Seven Trees
San Jose
Santa Teresa County Park
Almaden Quicksilver Park
Calero Reservoir County Park
Coyote Creek Park Chain
Morgan Hill
San Martin
Day Valley
Unit: 5
Unit: 6
Unit: 7
Unit: 8
Unit: 9a
Unit: 9b
Unit: 10
Unit: 12

The tables below show the projected acres of development, population and households within the area of proposed critical habitat in Santa Clara County by census tract. The first table shows the projections before SCVHCP / NCCP implementation, while the second presents the projections after implementation. Please see Appendix E, the Technical Appendix, for a description of how the number of households, developed acres, and population are projected within each census tract.

These tables show that the number of acres projected for residential development in the area of proposed critical habitat in Santa Clara County falls from 268 to 108 after the implementation of the SCVHCP / NCCP. Likewise the number of acres projected for commercial or industrial use falls from 42 to 12. At the same time, Table 2-3 shows that approximately 120 acres (108 plus 12) will still be developed within the area of critical habitat in Santa Clara County. For these acres, it is likely that the developer will be required to pay a fee to offset impacts to butterfly habitat.

Table 2-2: Projected Households, Population, and Greenfield Acres, 2008-2030
Santa Clara County, pre-SCVHCP Implementation

		Projections				
Unit	**Tract**	**Households**	**Population**	**Residential Acres**	**Commercial / Industrial Acres**	**Developable Acres in Tract within PCH**
5, 7, 9a	06085512100	441	1,285	137	19	4,494
5	06085512001	141	525	14	23	2,319
5	06085503328	107	363	12	0	855
7	06085511911	110	319	73	0	1,376
6	06085512035	74	212	11	0	191
10	06085512305	17	50	12	0	479
12	06085512401	1	3	1	0	215
5	06085512700	4	10	8	0	1,037
Total		**895**	**2,767**	**268**	**42**	**10,966**

Note: PCH = Proposed Critical Habitat

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) BEC growth allocation model.

(3) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.

Table 2-3: Projected Households, Population, and Greenfield Acres, 2008-2030
Santa Clara County, post - SCVHCP Implementation

Unit	Tract	Projections				Developable Acres in Tract within PCH
		Households	Population	Residential Acres	Commercial / Industrial Acres	
5, 7, 9a	06085512100	126	367	39	5	1,464
5	06085512001	43	159	4	7	245
5	06085503328	24	80	3	0	129
7	06085511911	86	250	57	0	778
6	06085512035	14	40	2	0	53
10	06085512305	2	7	2	0	46
12	06085512401	1	3	1	0	215
5	06085512700	0	1	1	0	68
Total		**296**	**906**	**108**	**12**	**2,998**

Notes: PCH = Proposed Critical Habitat

(1) PCH = Proposed Critical Habitat.

(2) Census tract 060-85-512700 was dropped from the analysis in the post - SCVHCP / NCCP scenario because not enough critical habitat overlaps projected development in this tract after Reserve System areas are removed.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) BEC growth allocation model.

(3) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.

Estimated Impacts on Urban Development

The following tables present the impacts of implementing the SCVHCP / NCCP on urban development. The first table presents the loss resulting from precluding development in the area of the Reserve System. Setting aside land in the Reserve Areas will lead to a net loss of projected development in that area. The cost of avoidance is estimated by multiplying the value per acre of developed land by the number of acres that would have been developed within each census tract absent the SCVHCP / NCCP. It is assumed that development in these areas would have occurred uniformly over the time period. However, impacts to landowners are anticipated to occur at the time of the designation.

This analysis uses an open city model, meaning that the restriction on development under the SCVHCP / NCCP will not result in a total loss of development region-wide. A total of approximately 182 acres will be avoided by development over the next 23 years, which is small compared to the total amount of land in Santa Clara and surrounding counties that could be developed. Therefore, this analysis does not expect the regional housing market to be affected by the SCVHCP / NCCP.

The second table presents the impact of charging fees on development within the unprotected areas of the SCVHCP / NCCP. The cost of fees was calculated by multiplying the total acres projected for development by the $11,000 fee price. Development under the SCVHCP / NCCP would not experience a delay in obtaining a permit because the SCVHCP / NCCP streamlines the permit process and eliminates the need for individual consultation with the Service.

Table 2-4: Estimated Baseline Impacts of Avoiding Development in Reserve System
Santa Clara County

Unit	Tract	Residential Acres Avoided	Commercial/ Industrial Acres Avoided	Total Acres Avoided	Value of Developed Land	Cost of Avoidance [1]
7	06085511911	16	0	16	$2,000,000	$23,000,000
5, 7, 9a	06085512100	98	14	112	$1,900,000	$150,000,000
5	06085512001	10	16	26	$6,700,000	$120,000,000
5	06085503328	9	0	9	$8,100,000	$52,000,000
6	06085512035	9	0	9	$4,600,000	$30,000,000
10	06085512305	10	0	10	$710,000	$5,100,000
12	06085512401	0	0	0	$560,000	$0
Total		**152**	**30**	**182**		**$380,000,000**

Notes:
(1) Cost of avoidance calculated by multiplying the total acres avoided by the value of developed acres.
(2) Cost of avoidance is discounted over 23 years using a three percent discount rate.
(3) Total may not be equal to the sum of the corresponding rows above due to rounding.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.
(3) BEC growth allocation model.
(4) DataQuick Information Systems.
(5) Office of Federal Housing Enterprise Oversight.
(6) Marshal and Swift Construction Costs.
(7) Development impact fees obtained from Palo Alto, San Jose, and Morgan Hill Engineering Departments.

Table 2-5: Estimated Baseline Impacts of Fees
Santa Clara County

Unit	Tract	Residential Acres Developed	Commercial/Industrial Acres Developed	Total Acres Developed	Cost of Fees [1]
7	06085511911	57	0	57	$450,000
5, 7, 9a	06085512100	39	5	44	$350,000
5	06085512001	4	7	11	$87,000
5	06085503328	3	0	3	$24,000
6	06085512035	2	0	2	$16,000
10	06085512305	2	0	2	$16,000
12	06085512401	1	0	1	$7,900
Total		**108**	**12**	**120**	**$940,000**

Notes:
(1) Cost of fees calculated by multiplying the total developed acres by the fee per acre.
(2) Cost of fees is discounted over 23 years using a three percent discount rate.
(3) Fee on an acre of development in Santa Clara County under the SCVHCP / NCCP is approximately $11,000.
(4) Total may not be equal to the sum of the corresponding rows above due to rounding.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.
(3) BEC growth allocation model.
(4) Review of relevant biological opinions.

2.1.2. San Mateo County

For those critical habitat units located in San Mateo County, economic impacts may result from the recommendation in section 7 consultations that developers set aside land as compensation for project impacts, and from the delay in project completion in order to consult with the Service.

This analysis does not make an assumption about the likelihood that projected development in areas of proposed critical habitat in San Mateo County trigger a Federal nexus and lead to a section 7 consultation with the Service. It is possible that developers in proposed critical habitat will require a section 404 permit from the Army Corps of Engineers to comply with the Clean Water Act. However, this cannot be determined with certainty, as there is no way of knowing the exact location of classified jurisdictional waters within the area of proposed critical habitat. Therefore, this analysis presents a range of possible impacts. At the low end, no Federal nexus will be triggered and there will be no impact of butterfly conservation efforts on urban development. On the high end, all future development within the area of proposed critical habitat would require a 404 permit and be subject to conservation efforts through section 7 consultation.

To conserve the butterfly under listing, the Service has specified conservation recommendations in section 7 consultations in terms of purchasing land to compensate for impacts. Compensation recommendations oblige the developer to undertake actions that improve or protect habitat in some other location. On average, the compensation ratio of acres protected off-site for the butterfly to acres disturbed by development is 1.5:1.[41] The Service anticipates the compensation ratio will remain approximately the same in the future.[42]

This analysis assumes that compensation will occur in the future, regardless of the designation of critical habitat for the butterfly, due to the listing of the butterfly. Under listing, compensation land can be purchased on any appropriate serpentine soil habitat, not necessarily within designated critical habitat.[43] Therefore, a developer in San Mateo County could compensate in Santa Clara County where available land is cheaper.

The process of compensating for development may lead to delay in the construction of the project. Delay time is estimated to be the time required to complete consultation with

[41] Service to Army Corps of Engineers, "Formal Consultation on Nationwide Permit Modification for the Ranch on Silver Creek (Cerro Plata) Development," October 12, 2000; Service to Army Corps of Engineers, "Formal Endangered Species Consultation on the Proposed Kirby Canyon Recycling and Disposal Facility;" Service to U.S. Environmental Protection Agency, "Formal Endangered Species Consultation on the Prevention of Significant Deterioration Permit for the Proposed Metcalf Energy Center," March 7, 2001.

[42] Personal communication from Arnold Roessler, Listing Biologist, U.S. Fish and Wildlife Service, November 19, 2007.

[43] Personal communication from Arnold Roessler, Listing Biologist, U.S. Fish and Wildlife Service, November 19, 2007.

the Service. According to a review of available Biological Opinions for the butterfly, the average delay time for development projects is approximately six months.[44]

Identification of Lands to be Developed

This analysis considers impacts on privately owned, unprotected lands in San Mateo County. Unit 1 is proposed for exclusion from critical habitat under section 4(b)(2) of the Act, and is therefore considered in Appendix A of the economic analysis. Unit 2 is owned by San Francisco Public Utilities Commission (SFPUC) as part of the Peninsula watershed and not subject to development.

Although the proposed rule did not identify urban and suburban growth as a threat in units 3 and 4, this analysis considered the potential for development in these units. Most of the land in unit 3 is owned by city or county parks, or the SFPUC. However, 106 acres are privately owned and not protected, and are therefore considered potentially developable. Unit 4, which is in the Jasper Ridge Biological Preserve, is entirely protected and therefore not considered developable.

The results of projecting the number of acres that will be developed on developable land in San Mateo County are shown in Table 2-6 below. Please see Appendix E for further explanation of the growth projection model.

Table 2-6: Projected Households, Population, and Greenfield Acres, 2008-2030
San Mateo County

		Projections			
Unit	**Tract**	**Households**	**Population**	**Residential Acres**	**Commercial / Industrial Acres**
3	06081609700	4	10	1	0
3	06081613400	2	5	4	0
Total		**6**	**15**	**5**	**0**

Note: PCH = Proposed Critical Habitat

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) BEC growth allocation model.

Estimated Impacts on Urban Development

The estimated impacts associated with compensation for development in the area of proposed critical habitat in San Mateo County are shown in the tables below. It is assumed that development in these areas would have occurred uniformly over the time period. However, impacts to landowners are anticipated to occur at the time of the designation.

[44] Service to Army Corps of Engineers, "Formal Consultation on Nationwide Permit Modification for the Ranch on Silver Creek (Cerro Plata) Development," October 12, 2000; Service to Army Corps of Engineers, "Formal Endangered Species Consultation on the Proposed Kirby Canyon Recycling and Disposal Facility;" Service to U.S. Environmental Protection Agency, "Formal Endangered Species Consultation on the Prevention of Significant Deterioration Permit for the Proposed Metcalf Energy Center," March 7, 2001.

Note that these results reflect the impacts within the census tracts presented; however, compensation can be purchased in any serpentine soil habitat. As shown in Table 2-3 above, there are nearly 3,000 acres of land in Santa Clara County that could be purchased to compensate for development impacts. This is plenty of space to accommodate the amount of compensation land that may have to be purchased by developers in San Mateo County as a result of section 7 consultations.[45]

The number of compensation acres needed equals the area disturbed multiplied by the compensation ratio. The cost of compensation is then the number of compensation acres needed multiplied by the per acre cost of compensation land.

Delay costs are computed by multiplying the surplus from development (the value of developed land, multiplied by the projected acres of development) by the period of delay (six months) and by the interest rate. It is assumed that the delayed surplus from development will occur uniformly over the time period of the analysis. However, impacts to the landowner of project delay are incurred at the time of the designation. The welfare cost of delay is measured by assuming that economic surplus generated by development could have been invested at the market interest rate. The consultation process exposes the developer to additional uncertainty about the magnitude and timing of development. This analysis assumes that delay cost is measured with a fifteen percent rate of interest, which is a rate that is commonly used by developers to value a risky cash flow.

Table 2-7 shows the impacts of compensation. Table 2-8 presents the possible impacts of delaying development in order to complete a section 7 consultation.

Table 2-7: Estimated Baseline Impacts of Compensation
San Mateo County

		Projected development				
Unit	**Tract**	**Residential Acres**	**Commercial/ Industrial Acres**	**Total Acres**	**Compensation Acres Needed(1)**	**Cost of Compensation (2)**
3	06081613400	4	0	4	6	$0 - $43,000
3	06081609700	1	0	1	1.5	$0 - $11,000
Total		**5**	**0**	**5**	**7.5**	**$0 - 54,000**

Notes:
(1) Compensation needed calculated by multiplying total acres projected by the compensation ratio. Average compensation ratio from past consultations is 1.5 acres of compensation to 1 acre of development.
(2) Cost of compensation calculated by multiplying the compensation acres needed by the price per acre of compensation land. Price of an acre of compensation land in Santa Clara County is approximately $10,000.
(3) The cost of compensation is discounted over 23 years at a three percent discount rate.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Review of relevant biological opinions
(3) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

[45] Developers in San Mateo County may need to purchase approximately 7.5 acres (5 acres of development multiplied by 1.5, the ratio of compensation to development).

Table 2-8: Estimated Baseline Impacts of Delay
San Mateo County

Unit	Tract	Value of Developed Land	Total Projected Acres	Development Surplus[(1)]	Delay Impacts[(2)]
3	06081609700	$5,700,000	1	$5,700,000	$0 - $310,000
3	06081613400	$710,000	4	$2,900,000	$0 - $150,000
Total			**5**		**$0 - $460,000**

Notes:
(1) Development surplus calculated by multiplying the value of developed land by the total acres projected to be developed.
(2) Delay impacts calculated by multiplying the development surplus by the risky interest rate and the delay time.
Delay impacts are discounted over 23 years at a three percent discount rate.
(3) Average interest rate of a risky investment is assumed to be fifteen percent.
(4) Average delay time according to the consultation history is 6 months.
(5) Numbers may not sum due to rounding.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Review of relevant biological opinions
(3) DataQuick Information Systems.
(4) Marshal and Swift Construction Costs.
(5) Office of Federal Housing Enterprise Oversight.

2.2. Pesticide Application

All proposed critical habitat units may require special management due to the threat posed by pesticide use. Use of pesticides (i.e. insecticides and herbicides) in or adjacent to critical habitat may affect populations of butterflies within the units. Populations adjacent to areas where there is intensive use of pesticides may be at risk as a result of drift and runoff.[46]

2.2.1. Pesticides of Concern

In 1999, the Service published a memorandum in which it described its opinion on the effects of pesticides on ten animals, including the butterfly. The memorandum was created for the National Pesticide Consultation with the Environmental Protection Agency (EPA). Because critical habitat for the butterfly had not yet been designated, the Service did not consider which pesticides may destroy or adversely modify habitat at that time.

According to the memo, it was the Service's opinion that the registered uses of the following pesticides jeopardize the butterfly:

[46] 72 FR 48184, Proposed Rule.

- Acephate
- Azinphos-methyl
- Bendiocarb
- Chlorpyrifos
- Fenthion
- Naled
- Permethrin
- S-fenvalerate

The memo also found that the registered uses of the following pesticides are likely to adversely affect, but are not likely to jeopardize the species:

- Endosulfan
- Parathion
- Phorate
- Trifluralin[47]

According to the Service biologist who wrote the proposed rule for critical habitat for the butterfly, *Bacillus thuringiensis* ssp. *kurstaki,* which is used to control California Oakworm and other pest species in the genus *Lepidoptera*, may also threaten the butterfly when it is in the larval stage. However, formal studies of the effect of *B. thuringiensis* ssp. *kustaki* (also commonly referred to as Bt) on the butterfly have not been conducted.[48]

Malathion might negatively impact the butterfly; however, the effects of this pesticide on the butterfly are not well known. In at least one instance, larvae appeared to have survived a direct application of malathion by the California Department of Food and Agriculture. The application was conducted in the fall of 1981 when butterfly larvae were still in diapause, which may have enabled survival. More research is needed to determine the effects of malathion on the butterfly.[49]

In summary, more research is needed to determine which pesticides may threaten the butterfly and its habitat.[50]

2.2.2. Pesticide Use in the Area of Proposed Critical Habitat

The use of pesticides in and around the area of proposed critical habitat for the butterfly has been fairly minor in the recent past. According to the Deputy Agricultural

[47] Acting Field Supervisor, Sacramento Fish and Wildlife Office, "Updated Species Profiles for the National Pesticide Consultation," sent to section 7 Coordinator, Regional Office, Region 1 on January 6 1999.

[48] Electronic communication with Mike Thomas, Biologist, U.S. Fish and Wildlife Service, September 20, 2007.

[49] *Ibid.*

[50] Electronic communication with Mike Thomas, Biologist, U.S. Fish and Wildlife Service, October 31, 2007.

Commissioner / Sealer of San Mateo County no pesticide use records are on file for the area within or near the critical habitat units in San Mateo County; there are no production agricultural operations that report site specific pesticide use in any of the four proposed critical habitat units.[51]

Santa Clara County Department of Agriculture and Environmental Management reported the pesticides Naled, Chlorpyrifos, Cypermethrin, and Trifluralin were used in the Santa Clara County critical habitat units between the years 2005 to 2007.[52] These pesticides were used mainly in 2005 to treat lima beans and alfalfa. No pesticides of concern were reported in or near the proposed critical habitat units in 2006 and only Trifluralin was reported in 2007. The following figures show the locations in Santa Clara County (SCC) where the pesticides of concern (as identified in the 1999 memo) were used in or near butterfly proposed critical habitat.

[51] Electronic communication with Maria Mastrangelo, Deputy Agricultural Commissioner / Sealer for San Mateo County, on December 13, 2007.
[52] Electronic communication with Kate Pitka, Santa Clara County Department of Agriculture and Environmental Management, on December 7, 2007.

Figure 2-3

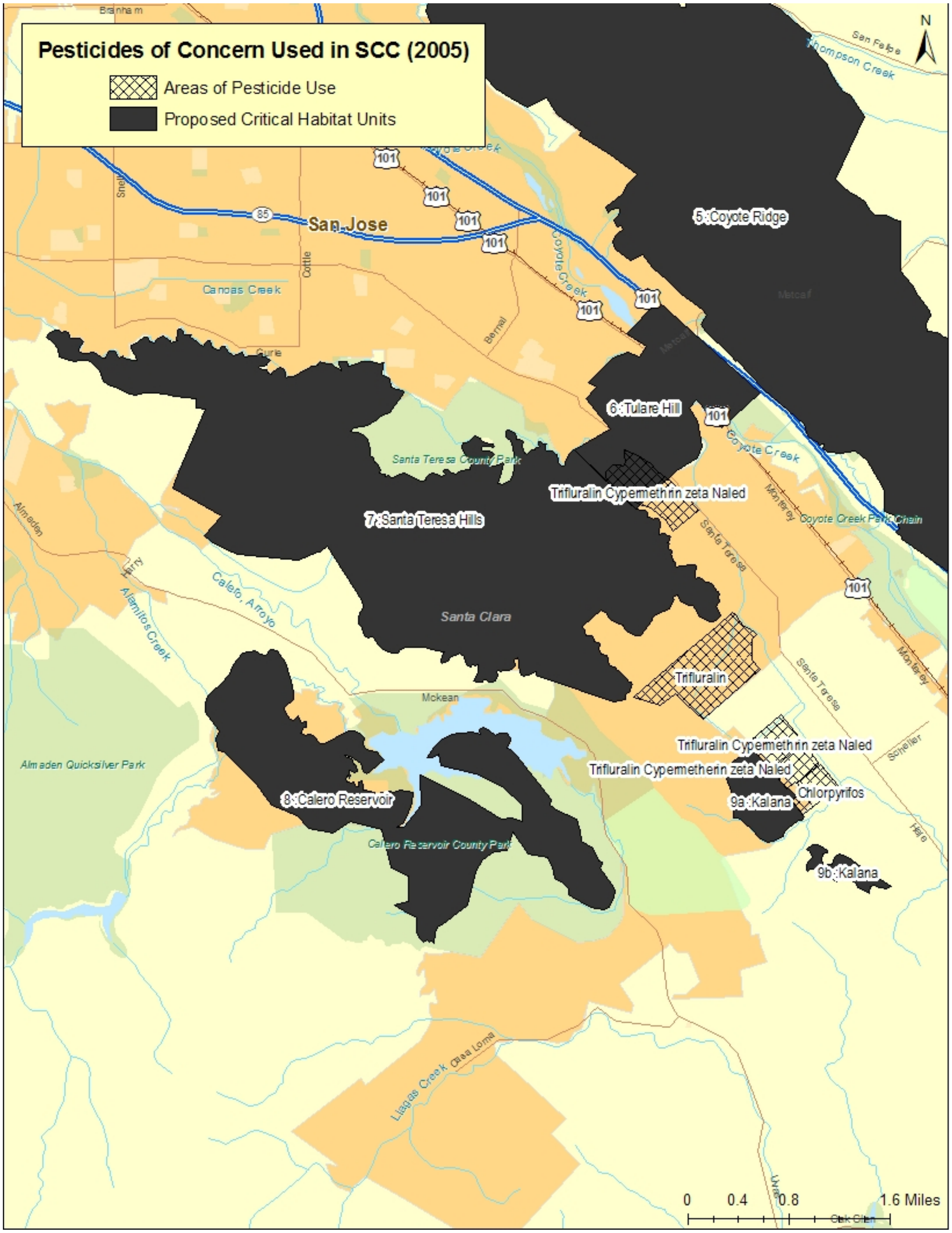
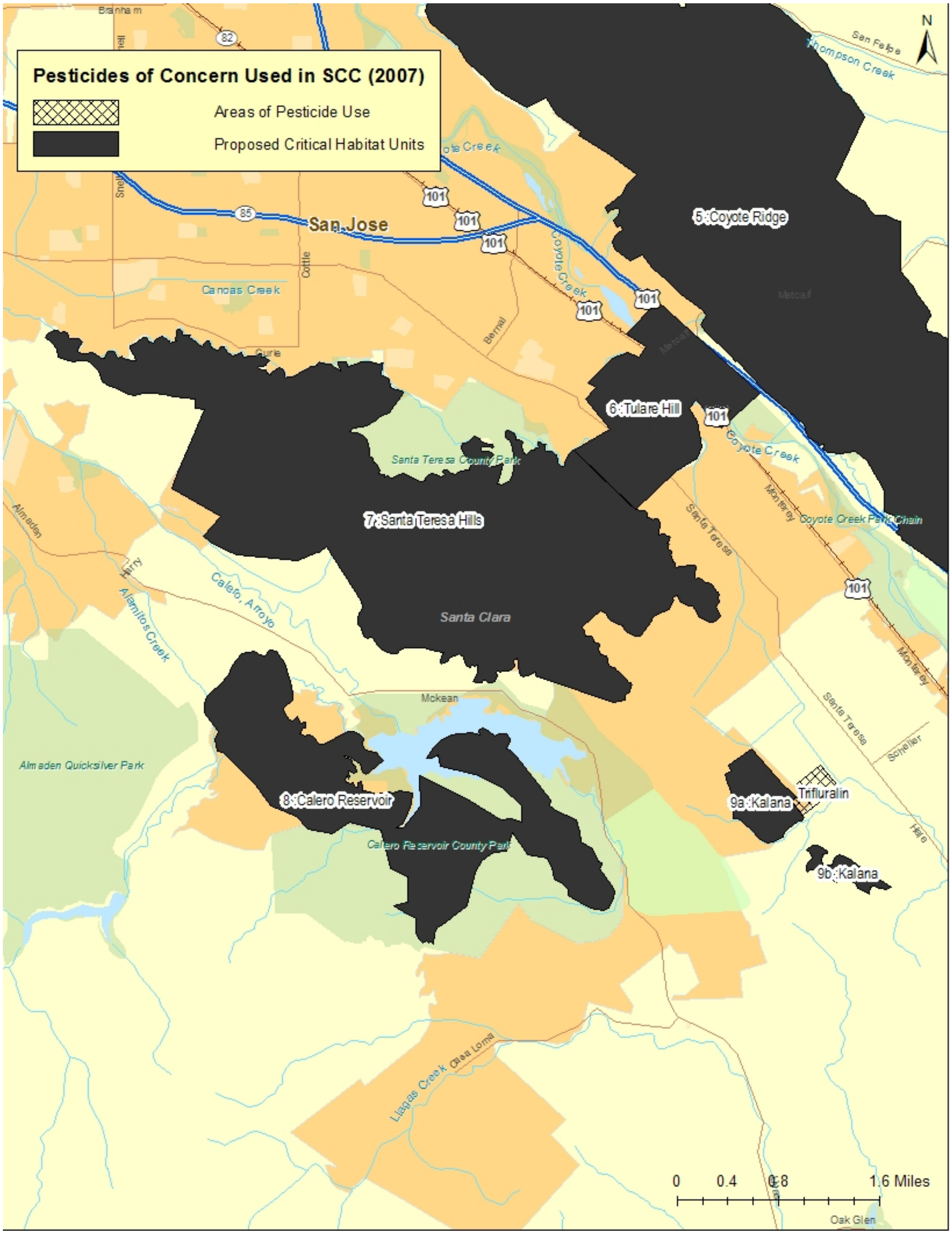

Pesticides of Concern Used in SCC (2005)
Areas of Pesticide Use
Proposed Critical Habitat Units
San Jose
5 :Coyote Ridge
6 :Tulare Hill
7 :Santa Teresa Hills
8 :Calero Reservoir
9a :Kalana
9b :Kalana
Trifluralin Cypermethrin zeta Naled
Trifluralin
Trifluralin Cypermethrin zeta Naled
Trifluralin Cypermetherin zeta Naled
Chlorpyrifos
Santa Teresa County Park
Santa Clara
Almaden Quicksilver Park
Calero Reservoir County Park
Coyote Creek
Coyote Creek Park Chain
Thompson Creek
Canoas Creek
Alamitos Creek
Llagas Creek
0 0.4 0.8 1.6 Miles
N

Figure 2-4


Pesticides of Concern Used in SCC (2007)
Areas of Pesticide Use
Proposed Critical Habitat Units
San Jose
5 :Coyote Ridge
6 :Tulare Hill
7 :Santa Teresa Hills
8 :Calero Reservoir
9a :Kalana
9b :Kalana
Trifluralin
Santa Teresa County Park
Santa Clara
Calero Reservoir County Park
Almaden Quicksilver Park
Coyote Creek
Canoas Creek
Alamitos Creek
Calero Arroyo
Llagas Creek
Thompson Creek
Coyote Creek Park Chain
Mckean
Oak Glen
0 0.4 0.8 1.6 Miles
N

2.2.3. Butterfly Conservation Efforts

According to the ESA, EPA must consult with the Service and NOAA Fisheries to ensure that registration of products under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) is not likely to jeopardize the continued existence of federally listed threatened or endangered species or result in the destruction or adverse modification of critical habitat. However, because of the complexity of consultations to examine the effects of pest-control products, there have been almost no consultations completed in the past decade. This brought about a new, simpler and more efficient method in 2004 for the EPA to consult with the Service and NOAA Fisheries over the pesticide approval process. Under the new process, EPA may utilize an optional procedure to develop a determination of the effects of a pest-control product on listed species for the Service's and NOAA Fisheries review. The procedure also allows EPA to request direct involvement of representatives of the Service and NOAA Fisheries in the effects analysis. As required by law, the Service and NOAA Fisheries would make the final determination whether threatened or endangered species are likely to be jeopardized by a FIFRA action.[53]

FIFRA generally prohibits the sale or distribution of a pesticide product unless it has first been ''registered'' by EPA under FIFRA section 12(a)(1)(A). EPA issues a license, referred to as a ''registration,'' for each specific pesticide product allowed to be marketed; the registration approves sale of a product with a specific formulation, in a specific type of package, and with specific labeling limiting application to specific uses. Each product is evaluated on a case-by-case basis. EPA requires both new and existing pesticides to be supported by extensive information about the potential ecological risks of the pesticide product. EPA may approve the unconditional registration of a pesticide product only if the agency determines, among other things, that use of the pesticide would not cause "unreasonable adverse effects on the environment."[54]

EPA registration or reregistration of pesticides is a Federal action that is regulated by the ESA; ESA mandates formal consultation with the Service on EPA pesticide registration. The 2004 Counterpart Rule (50 CFR Part 402) established three additional methods of achieving interagency cooperation. First, EPA could request the Service to provide available information (or references thereto) describing the applicable environmental baseline for each species or habitat that EPA determines may be affected by a FIFRA action. Second, EPA may request the Service to designate a suitably-trained Service Representative to participate with EPA in the development of an "effects determination" for one or more of those species or habitats. Third, EPA and the Service and NOAA Fisheries would establish new procedures for regular and timely exchanges of scientific information to achieve accurate and informed decision making.[55]

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[53] U.S. Fish and Wildlife News Release, "U.S. Fish and Wildlife, NOAA Fisheries Issue Regulations to Improve Endangered Species Consultation Process for Pest Control Products," July 29, 2004, accessed at: http://www.fws.gov/news/newsreleases/r9/0B3E2C86-65B8-D693-76ABD8DB3B3E3BFB.html.
[54] 50-CFR-Part 402.

[55] *Ibid.*

Despite the 2004 Counterpart Rule which brought about the simplified and alternative methods for EPA to consult with the Service, in May of 2007 the Center for Biological Diversity brought a law suit against the EPA over failing to consult with the Service over the use of pesticides in the Bay Area. In its complaint, it summarized the potential impacts of certain pesticides on the butterfly, citing the 1999 Service memorandum. The suit sought an order compelling EPA to begin and complete the consultation process as required by section 7 of the ESA. The suit also called for an order enjoining EPA from allowing pesticide uses that result in pesticides entering occupied habitat or designated critical habitat for eleven species within the San Francisco Bay watershed area until the consultation process has been completed and EPA has brought its pesticide registrations into compliance with section 7.[56]

As a result of the suit, the EPA is initiating consultation with the Service over the use of pesticides, starting with the red-legged frog. Although the current case is specific to the red-legged frog it has far reaching implications for consultation between the Service and the EPA on pesticide effects on the butterfly and a number of other species in the San Francisco Bay Area. It seems likely that the Service will consult with the EPA over those pesticides mentioned in the 1999 memo that affect the butterfly and its habitat. It is anticipated that the Service's recommendations for the use of the pesticides listed above will be more restrictive than in the 1999 memo. However, due to the amount of information that must be reviewed for each pesticide, consultation on pesticides that affect the butterfly will likely not happen for five years or more.[57]

It is possible users of certain pesticides such as Naled, Chlorpyrifos, Cypermethrin, Trifluralin Acephate, and Permethrin in Santa Clara and San Mateo Counties could be adversely affected by pesticide use restrictions for the butterfly and its habitat in the future. However, estimating these impacts at this time is speculative because the regulatory process is under development as a result of the suit brought against the EPA by the Center for Biological Diversity. Additionally, this report recognizes that the EPA will likely incur administrative costs from consulting with the Service over the use of various pesticides in and around the butterfly's habitat. However, those administrative costs are also currently speculative because the methodology employed by the EPA to consult with the Service is under review as a result of the suit.

In conclusion, the threat of pesticides to the butterfly has not been clearly identified and more research is needed to do so. Additionally, according to recent County records, pesticides of potential concern are not commonly used in or near the butterfly proposed critical habitat. Finally, the regulatory mechanisms for limiting pesticide use to conserve the butterfly are currently changing and uncertain. This analysis is unable to provide a reasonably defensible estimate of impacts associated with managing pesticide use for the benefit of the butterfly and its habitat.

[56] *Center for Biological Diversity* v. *Environmental Protection Agency* (2007).

[57] Electronic communication with Mike Thomas, Biologist, U.S. Fish and Wildlife Service, October 31, 2007.

2.3. Invasion of Nonnative Plants

This section of the report considers the impacts of managing the invasion of nonnative plants in the butterfly's habitat. The growth and spread of nonnative plants in serpentine soil habitats (which are typically nutrient poor) is encouraged by air pollution (primarily nitrogen deposition). The increased density of nonnative vegetation negatively affects the butterfly's host plants through competition and overcrowding.[58] The Service makes recommendations regarding the source of the threat (pollution) and regulates the result of the threat (invasion of non-native plants).[59] This first part of this section studies the economic impacts of controlling nonnative plants, while the latter part focuses on the impacts of addressing air pollution.

2.3.1. Management of Invasive Plants

While the Service has the ability to recommend project modifications on projects that increase soil nitrogen in the butterfly's critical habitat it is unclear how the Service may regulate air quality in the broader sense. Therefore, the Service plans to treat the result of nitrogen deposition - invasion of nonnative plants - rather than the source.[60]

Cattle grazing has been proven to be a cost effective tool for managing serpentine grasslands and protecting habitat for the butterfly at Kirby Canyon Conservation Land Trust in Santa Clara County. The cattle grazing program at Kirby Canyon utilizes low intensity grazing with one cow or calf per ten acres and two grazing periods per year, one in winter or spring and one in summer or fall. Cattle are allowed to graze over large paddocks, approximately 1,000 acres or larger. Ranchers typically remove their cattle from the conservation area in April, coinciding with the time that the cattle stop gaining weight and when annual wildflowers come into bloom, including the host plants for the butterfly. Because the host plants are usually less palatable to grazing animals, they tend to persist in areas grazed by cattle or sheep. A grazing regime also crops and limits the seed production of annual grasses, thereby improving the competitive position of broadleaf species (wildflowers) so that they maintain a higher overall density within the grassland.[61]

When properly managed, grazing may be a cost effective method of controlling invasive species and increasing grassland habitat. Recent research conducted for the SCVHCP / NCCP demonstrated that implementing a grazing regime is revenue neutral for landowners. Previous biological opinions for development, highways, and power plants have included a recommendation for purchasing compensation land and managing the

[58] 72 FR 48183, Proposed Rule.

[59] Electronic communication with Mike Thomas, Fish and Wildlife Biologist at US Fish and Wildlife Service Sacramento Office, on September 20, 2007.

[60] Electronic communication with Mike Thomas, Fish and Wildlife Biologist at US Fish and Wildlife Service Sacramento Office, on September 20, 2007.

[61] San Bruno Mountain Habitat Conservation Plan Year 2006 Activities Report for Endangered Species Permit PRT-2-9818, available at http://www.traenviro.com/sanbruno/hcp/ann_reports/2006_report.pdf, accessed on October 26, 2007.

land by instituting an appropriate grazing regime.[62] The costs of installing and maintaining the grazing infrastructure (fencing, gates, watering troughs, etc.) will be offset by the revenues gained from grazing leases. Grazing leases often provide a net profit for landowners. However, the Service recommends a specific, low-density grazing regime for invasive plant management purposes (one cow per 10 acres). As a result, lease revenue is expected to be lower than usual, resulting in a cost neutral grazing practice.[63]

2.3.2. Air Pollution

The primary sources of nitrogen deposition in the butterfly habitat are power plants and vehicular traffic. Industrial point sources and non-point sources such as automobiles emit nitrogen compounds (both NO_x and ammonia) to the air. Serpentine soils are nitrogen-poor, and plants native to these soils are adapted to this condition. Nitrogen compounds are deposited on soils and vegetation from the air in both wet (during rainfall) and dry conditions. Nitrogen tends to be tightly recycled by the plants and microbes in infertile soils like serpentine soil, causing fertilization impacts to persist for years. This deposition artificially fertilizes serpentine soils, creating better conditions for nonnative plant species. Nonnative annual grasses grow rapidly, crowding out the native plants that serve as larval host plants and adult nectar plants to the butterfly.[64]

Air pollution is common near butterfly habitat. All major remaining populations of the butterfly live in areas subject to air pollution from San Jose, Santa Clara Valley, and other urban centers. Excess nitrogen deposition can significantly diminish the population size and chances of survival of the butterfly. Although nutrient deposition from air pollution is well studied, less is known about how various rates of deposition may impact butterfly habitat. Because the potential risk to the species is great, however, in past consultations the Service adopted a "precautionary principle" to manage the problem conservatively.[65]

The California Air Resources Control Board reports atmospheric nitrogen deposition in the Fremont and San Jose areas at seven kg/ha-yr. These estimates have an uncertainty

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[62] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the U.S. Highway 101 Widening, Route 85/U.S. 101 South Interchange, Riparian and Wetland Consolidated Biological Mitigation Project, Bailey Avenue Extension/U.S. 101 Interchange, and Coyote Valley Research Park Projects, San Jose and Santa Clara County, California, on July 31, 2001; US Fish and Wildlife Service to Mr. Duong Nguyen, US Environmental Protection Agency Region IX, Formal Endangered Species Consultation on the Prevention of Significant Deterioration Permit for the Proposed Metcalf Energy Center, San Jose, Santa Clara County, California, on March 7, 2001; US Fish and Wildlife Service to MR. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Consultation on Nationwide Permit Modification for the Ranch on Silver Creek (Cerro Plata) Development, San Jose, Santa Clara County, California, on October 12, 2000.

[63] Electronic communication with David Zippin, principal at Jones & Stokes, a consultant for the SCV HCP/NCCP, on January 15, 2008.

[64] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the U.S. Highway 101 Widening, Route 85/U.S. 101 South Interchange, Riparian and Wetland Consolidated Biological Mitigation Project, Bailey Avenue Extension/U.S. 101 Interchange, and Coyote Valley Research Park Projects, San Jose and Santa Clara County, California, on July 31, 2001.

[65] *Ibid.*

value of 30 to 50 percent, resulting in estimates between four and 10.5 kg/ha-yr. Stuart Weiss, a Stanford University biologist who conducted studies on nitrogen deposition in butterfly habitat, adjusted these figures based on surface composition, seasonality of serpentine grasslands, and higher pollution levels in the South Bay Area to derive deposition rates of 10 to 15 kg/ha-yr. These estimates have an uncertainty of 50 percent, for a range of five to 22.5 kg/ha-yr. A later study made further adjustments to account for location differences and ambient NO_x and ozone values to derive an annual deposition rate in the vicinity of the Calpine / Bechtel Metcalf Energy Center site of 8.4 kg/ha-yr.[66]

2.3.2.1. Power Plants

In 2000, Calpine and Bechtel consulted with the Service on the Metcalf Energy Center construction in San Jose. Calpine and Bechtel's consultants prepared an Impact Analysis for Metcalf Energy Center NO_x Emissions to determine potential impacts from nitrogen deposition from the Metcalf Energy Center's emissions on surrounding serpentine landscapes. Annual deposition of nitrogen from the operation of the Metcalf Energy Center alone was estimated to be 1.13 to 1.5 kg-ha/yr on Tulare Hill and 0.13 to 3 kg-ha/yr on Coyote Ridge.

The Metcalf Energy Center adds to the nitrogen baseline in the project area. The nitrogen deposition rate considered sufficient to effect ecosystem structure and diversity is three to 10 kilogram-hectares per year. The project area already had levels of nitrogen that exceed this threshold. Calpine and Bechtel's consultants concluded that the transformation of serpentine soils and decline of butterfly populations in the area are related to fertilization by atmospheric nitrogen deposition. While the contribution of nitrogen from the Metcalf Energy Center operation alone is relatively low, ambient values (9.9 to 11.4 kg-ha/yr) approach or exceed the high range of nitrogen deposition (10 kg/ha-yr) considered sufficient to affect ecosystem structure and diversity. Any incremental increase in nitrogen deposition to an already stressed ecosystem negatively affects the butterfly's habitat further.[67] As explained below, Calpine Corporation completed the Metcalf Energy Center after implementing certain minimization efforts.

Calpine Corporation

Calpine is a major U.S. power company, capable of delivering nearly 24,000 megawatts of electricity to customers and communities in 18 states in the United States. The company owns, leases and operates low-carbon, natural gas-fired and renewable geothermal power plants. Calpine is North America's leading geothermal power producer.[68]

The 2000 section 7 consultation for the Metcalf Energy Center required the purchase of off-site compensation land and the purchase of pollution credits in order to off-set the increase in nitrogen created by the plant. Calpine purchased a total of 131 acres of

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[66] *Ibid.*

[67] US Fish and Wildlife Service to Mr. Duong Nguyen, US Environmental Protection Agency Region IX, Formal Endangered Species Consultation on the Prevention of Significant Deterioration Permit for the Proposed Metcalf Energy Center, San Jose, Santa Clara County, California, on March 7, 2001.

[68] Calpine website, available at http://www.calpine.com/about/index.asp, accessed on November 2, 2007.

serpentine habitat in a conservation easement to compensate for nitrogen impacts to serpentine soils: 116 acres on Tulare Hill and 15 acres on Coyote Ridge. Further, Calpine was required to compensate for air degradation in the butterfly's habitat on Tulare Hill and Coyote Ridge by purchasing pollution credits as directed by the Bay Area Air Quality Management District at a ratio of 1.15 to 1.[69]

Calpine implemented a number of project modifications to minimize impacts to the butterfly and other sensitive species in the project footprint. Calpine modified the project design for the Metcalf Energy Center to avoid impacts to the biological resources within riparian habitats of the Coyote Creek and Fisher Creek corridors (with the horizontal directional drilling method and with a 100-foot setback from Fisher Creek). As described above, Calpine also dedicated 131 acres of serpentine habitat and made an endowment in excess of $1 million to cover management and maintenance of the serpentine habitat in perpetuity.[70]

Additionally, Calpine pays annual maintenance costs that are not covered by the endowment for 30 years after the endowment was set, in order to let the endowment mature. Maintenance efforts that are not covered by the endowment are managing the mitigation land, including controlling invasive species; conducting biological surveys, monitoring, and reporting; and carrying out other maintenance efforts.[71] Total future impacts to Calpine of ongoing management efforts are estimated at approximately $1.2 million, as described in the table below.

Table 2-9: Estimated Economic Impacts to Calpine

Conservation Effort	Future Impacts	Annualized Future Impacts
Biological surveys and reporting on CH2M Hill	$353,600	$20,880
Hire biologist to conduct field work	$506,840	$29,930
Control invasive plants	$80,000	$5,000
Other maintenance efforts	$54,900	$3,240
Silicon Valley Land Conservancy	$248,430	$14,670
Total	**$1,200,000**	**$74,000**

Source:
(1) Executive Director of Silicon Valley Land Conservancy.

Future Power Plants

The California Energy Commission has the statutory responsibility for licensing thermal power plants 50 megawatts and larger and related facilities such as transmission lines, fuel supply lines, water pipelines, etc. The Energy Commission coordinates its review of

[69] US Fish and Wildlife Service to Mr. Duong Nguyen, US Environmental Protection Agency Region IX, Formal Endangered Species Consultation on the Prevention of Significant Deterioration Permit for the Proposed Metcalf Energy Center, San Jose, Santa Clara County, California, on March 7, 2001.

[70] Metcalf Energy Center website, available at http://www.metcalfenergycenter.com/facts/biological.asp, accessed on October 31, 2007.

[71] Personal communication with Craige Edgerton, Executive Director of Silicon Valley Land Conservancy, on January 14, 2008.

the facility with the Federal agencies, including the US Environmental Protection Agency, that will be issuing permits to ensure that the Energy Commission certification incorporates conditions of certification that would be required.[72]

While it is likely that future power plants in the butterfly's critical habitat would have similar compensation requirements as those for the Metcalf Energy Center (as described below), future impacts are not foreseeable. The Energy Commission website lists the status of all the energy facilities it has reviewed for project approval. At this time there are no power plants planned in or near the study area.[73]

2.3.2.2. Vehicular Traffic

The other major source of air pollution in the butterfly's habitat is vehicular traffic. The Service issued one consultation on five projects that impact vehicular traffic in the butterfly's habitat: the City of San Jose's Bailey Avenue / Highway 101 Interchange (Bailey/101), Coyote Valley Research Park (CVRP) development, the Santa Clara Valley Transportation Authority's (VTA) 101 Widening project (101 Widening), VTA's 85/101 South Interchange project (85/101 Interchange), and VTA's Riparian and Wetland Consolidated Biological Mitigation Project (Mitigation Project).

According to the CVRP DEIR, the CVRP will contribute approximately 1271 pounds of NO_x per day into the Bay Area Air Basin, generated by the automobiles of approximately 20,000 employees at the CVRP. The added nitrogen would be generated in the vicinity of the CVRP and extend out along the commute distances of the employees. Additionally, it is likely the CVRP will utilize commercially generated energy from the Metcalf Energy Center that may also contribute to nitrogen deposition in the region. The environmental documents for the Bailey interchange, 101 widening, and 85/101 interchange projects do not address the effects of nitrogen beyond those addressed in the CVRP DEIR. However, VTA outlined the projected vehicular use of U.S. 101 with project implementation between Tully Road and Dunne Road. Based on this research, it was evident that the widening of U.S. 101 led to a significant increase in the total daily vehicle miles traveled (VMT). [74]

The increase in VMT can be used to predict the additive effects of NO_x to the existing baseline. Nitrogen emission per vehicle may increase or decrease slightly depending on speed (which determines per-engine effort). The effect of vehicle speed is less than a quarter of the total, so it was assumed that local vehicular nitrogen emissions due to the project would increase approximately 35 percent above the existing baseline. Based on the numbers provided by VTA and information stated in the Biological Assessment for the 101 Widening project, the Service determined that the additive NO_x resultant from the

[72] California Energy Commission website, Energy Facilities Siting / Licensing Process page, available at http://www.energy.ca.gov/sitingcases/index.html, accessed on October 1, 2007.

[73] *Ibid.*

[74] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the U.S. Highway 101 Widening, Route 85/U.S. 101 South Interchange, Riparian and Wetland Consolidated Biological Mitigation Project, Bailey Avenue Extension/U.S. 101 Interchange, and Coyote Valley Research Park Projects, San Jose and Santa Clara County, California, on July 31, 2001.

101 widening would be approximately 2,915 lbs NO_x/day at buildout of eight lanes, and 6,809 lbs NO_x/day at buildout of eight lanes with added traffic. Because the project description described in this biological opinion addresses the widening of 101 to six lanes, the calculations are likely an overestimate of the resultant NO_x generated at project completion. Results from the Metcalf Energy Center studies indicated most nitrogen emissions are deposited within a few kilometers of the source, thus the effects of the increase in nitrogen emissions mostly occur locally to the Coyote Valley area. The Service is of the opinion that the Metcalf Energy Center models serve as an indicator of how NO_x will be deposited throughout Coyote Valley. [75]

In order to address the potential increase in nitrogen deposition, the Service required that "CVRP or the City shall document to the Service that no significant capacity or travel-speed increases will result from Bailey over-the-hill improvements to be implemented as a result of the CVRP. Any such increase shall require separate consultation." However, construction of the CVRP has stalled following the results of the first DEIR and developers are currently working on another draft. Therefore, the future of the project construction and completing project modifications remains uncertain.

California Department of Transportation

It is reasonable to assume that future highway construction or expansion projects in critical habitat would trigger a Federal nexus, a section 7 consultation, and would require similar project modifications as those in the City of San Jose's Bailey Avenue / Highway 101 Interchange, Coyote Valley Research Park development, the Santa Clara Valley Transportation Authority's 101 Widening project, VTA's 85/101 South Interchange project, and VTA's Riparian and Wetland Consolidated Biological Mitigation Project. In order to assess whether there are any planned highway construction or expansion projects in the butterfly's proposed critical habitat, this analysis reviewed Caltrans' road projection data. Caltrans developed a database called the California Transportation Investment System (CTIS). CTIS includes spatial data on all planned highway projects from regional transportation plans approved as of summer 2003 as well as all programmed projects from the 2004 State Transportation Improvement Program (STIP) and the State Highway Operation and Protection Program (SHOPP).[76] Overlaying the data on all planned and programmed highway projects onto the area of proposed critical habitat reveals that there are no highway projects in the area for the next twenty years. Therefore, future economic impacts of vehicle traffic on the butterfly are not reasonably foreseeable.

2.4. Other Conservation Efforts

In addition to the conservation efforts previously described, there are a number of agencies undertaking conservation efforts for the butterfly that are not related to a specific threat to the butterfly. The efforts are a result of compliance with the CEQA

[75] *Ibid.*

[76] Caltrans website, CTIS page, available at http://www.caltrans.ca.gov/hq/tpp/offices/osp/ctis.html, accessed on October 26, 2007.

review process, research projects, or are undertaken on a voluntary basis to help preserve the butterfly. Table 2-10: Estimated Economic Impacts of Other Butterfly Conservation Efforts breaks down the impact of individual conservation efforts undertaken by those entities that were willing or available to disclose their costs. The applicable sources are noted as well.

2.4.1. San Francisco Public Utilities Commission

San Francisco Public Utilities Commission (SFPUC) manages the Peninsula Watershed, located in proposed critical habitat Units 2 and 3. The Peninsula Watershed encompasses 23,000 acres in central San Mateo County. The Peninsula Watershed is used primarily for water collection, water storage, and water quality protection, but also serves as a State Fish and Game Refuge and is designated by the California Department of Forestry and Fire Protection as a hazardous fire area. A Scenic Easement (19,000 acres) and a Scenic and Recreation Easement (4,000 acres), established through a four-party agreement between the SFPUC, the U.S. Department of the Interior, Caltrans, and San Mateo County, also overlay the Watershed. The area is used mainly for recreation activities including hiking, biking, walking and running.[77]

A Peninsula Watershed Management Plan was published in 2003 and updated in 2006. The Management Plan outlines actions to conserve the Peninsula Watershed including management actions on: hazardous materials, stormwater, waste, roads, water conservation, fire, vegetation and soil management, wildlife, and aquatic life. Soil and vegetation management actions include clearing nonnative species and restoring native plants to the area. Wildlife management actions include surveys, monitoring, and completing a Multi Species Habitat Conservation Plan for species of concern in the Watershed.

In 1997, the San Francisco Board of Supervisors passed a resolution calling for public recreational access to the Peninsula Watershed along a more interior route – the Fifield / Cahill Ridge service road, which runs along the ridge through most of the northern portion of the Watershed. The CDFG and USFWS suggested the preparation of an EIR for this segment of the Bay Area Ridge Trail due to ESA concerns. The EIR included mitigation measures for constructing the Fifield / Cahill Ridge trail, including constructing public education signs and conducting butterfly monitoring. SFPUC is required to implement a monitoring program for the habitats and food-plants of the four endangered and threatened butterflies in the area, including the Bay Checkerspot Butterfly. The monitoring program detects annual changes in the distribution and abundance of food-plants and the results are used to determine when to temporarily fence stands of food-plants or to exclude trail users from portions of the trail when the butterflies are active or using the food-plants.[78]

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[77] San Francisco Public Utilities Commission website, available at http://sfwater.org/msc_main.cfm/MC_ID/20/MSC_ID/177, accessed on October 31, 2007.

[78] San Francisco Planning Department Peninsula Watershed Management Plan, FEIR, certified January 11, 2001, available at http://sfwater.org/detail.cfm/MC_ID/20/MSC_ID/177/MTO_ID/349/C_ID/1357, accessed on October 31, 2007.

Total future impacts to SFPUC, as shown in Table 2-10, of efforts to conserve the butterfly are estimated to be approximately $254,000 between 2008 and 2030.

2.4.2. Stanford University

Stanford University's Jasper Ridge Biological Preserve (JRBB) is located near Stanford University's campus in the eastern foothills of the Santa Cruz Mountains and comprises the 329 acre proposed critical habitat unit 4. The 1,189 acre preserve provides a natural laboratory for researchers, educational experiences to Stanford's students and docent-led visitors, and refuge to native plants and animals.[79]

Stanford generally aims to conserve the JRBP by keeping it as natural as possible and so does not actively manage the preserve. Stanford further limits impacts to the ecosystem by restricting public access to the preserve except for allowing a limited amount of tours. Additionally, biologists conduct monitoring for the butterfly for 1 to 2 hours a day, 3 to 4 days per week in the springtime. The area has not been occupied since 1998.[80] When the butterfly was still present in the area, biologists conducted monitoring every day, and did mark-release-recapture studies. Previous to 1998, JRBP biologists reported monitoring results to the Service but have since stopped as JRBP no longer has a take permit.

JRBP is best known for the decades of intensive study conducted by Prof. Paul Ehrlich and colleagues. Ehrlich accumulated more information about the population fluctuations of the butterfly than probably any other non-vertebrate and made it a model system for many questions in conservation. Currently professors from biology, history, soil science, and law are extending this legacy by examining fundamental issues in restoring any extinct species or lost habitat by looking at possibilities for reintroducing the butterfly to the JRBP. The professors received a grant for $150,000 from the Stanford Institute for the Environment, to last from May 2006 until February 2008, which the professors hope to extend. They are assessing the potential for reintroducing the butterfly by studying how to create new habitat, how to manage its current habitat, and the butterfly's genetics.[81]

Total estimated future economic impacts to Stanford associated with research are approximately $159,000. These only include the costs of actions taken to conserve the butterfly. Stanford receives grants, donations and other support for its efforts to conserve the butterfly.

[79] Stanford University Jasper Ridge Biological Preserve website, available at http://jrbp.stanford.edu/, accessed on October 31, 2007.

[80] Please note that although this unit is unoccupied, this analysis does not consider costs in this unit to be incremental to the proposed critical habitat designation because these activities would occur regardless of the designation of critical habitat.

[81] Personal communication with Carol Bogg, Stanford University biologist, on October 30, 2007.

2.4.3. Santa Clara County Department of Parks and Recreation

The Santa Clara County Department of Parks and Recreation (SCCDPR) manages a 45,000 acre system of urban and mountain parks, trails, lakes, streams and open space.[82] Santa Clara County manages the Coyote Ridge Regional Park in unit 5; Coyote Creek Park, Metcalf Park, and Santa Teresa County Park in unit 6; Santa Teresa County Park in unit 7; Calero County Park in unit 8; and Coyote Lake-Harvey Bear Ranch County Park in Unit 11.

Grazing benefits the butterfly by controlling nonnative invasive plant species. However, initial costs to SCCDPR for implementing grazing can be prohibitive because SCCDPR needs to install fencing along the perimeter of the property and in some cases must ensure adequate water sources for the cattle. Fencing costs approximately $5 to $7 per linear foot.[83] However, once grazing is in place, the costs to SCCDPR are minimal and it can license grazing rights to ranchers. Due to the high initial cost of implementing grazing, SCCDPR does not currently actively manage either Coyote Ridge Regional Park or Metcalf Regional Park. SCCDPR currently manages Coyote Lake-Harvey Bear Ranch Park by licensing grazing on the property.

At Coyote Lake-Harvey Bear Ranch Park there were 206 animal unit equivalents (AUE) grazed during the period from 2006 to 2007. Animal unit equivalent is defined as one mature cow (two or more years old) and may include calves (that cannot exceed 8 months of age); one AUE may be a calf-cow pair. The cattle were grazed at Coyote Lake-Harvey Bear Ranch Park for five months (although an average year would have run from October 1st to June 30th) at a rate of $16.50 per animal unit month (AUM), where AUM is defined as one AUE grazing for thirty days. [84]

SCCDPR is planning to implement grazing in Santa Teresa County at Calero County Park beginning in 2009, pending the approval of the SCVHCP / NCCP, and to continue grazing in Coyote Lake-Harvey Bear Ranch Park.[85] These three parks will fall under the jurisdiction of the SCVHCP / NCCP. Revenue streams in these parks will be limited by the one cow per 10 acres restriction placed on grazing by the SCVHCP / NCCP, and counterbalance the implementation cost. Therefore, implementing a grazing regime in the Santa Clara County parks is estimated to be revenue neutral.[86]

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[82] Santa Clara County Department of Parks and Recreation website, available at http://www.parkhere.org/portal/site/parks/, accessed on November 2, 2007.

[83] Personal communication with Mark Frederick, Construction Services Manager for the Santa Clara County Department of Parks and Recreation, on November 1, 2007.

[84] Ibid.

[85] Personal communication with Margaret Hastings, Associate Real Estate Agent for the Santa Clara County Department of Parks and Recreation, on November 2, 2007.

[86] Electronic communication with David Zippin, principal at Jones & Stokes, a consultant for the SCV HCP/NCCP, on January 15, 2008.

2.4.4. Cordevalle Golf Club

Cordevalle Golf Club (Cordevalle) is owned by Rosewood Hotels and Resorts. Cordevalle is located in the countryside of San Martin and features a 260-acre, 18-hole championship course.[87] As compensation for construction of Cordevalle, Rosewood Hotels and Resorts purchased approximately 298 acres that will eventually be preserved as open space with a conservation easement, including 42.3 acres that will be managed in the future to benefit serpentine soil species.[88] The management actions are not yet planned and cannot be quantified at this time.

Table 2-10: Estimated Economic Impacts of Other Butterfly Conservation Efforts

Conservation Effort	Future Impacts	Annualized Future Impacts
Estimated Economic Impacts to Stanford University		
Research support	$158,600	$9,364
Estimated Economic Impacts to SFPUC		
Butterfly monitoring	$250,000	$15,000
Total Costs	**$410,000**	**$24,000**

Sources:
(1) Stanford University Jasper Ridge Biological Preserve website.
(2) Planner for SFPUC Watershed Group.

[87] Cordevalle website, available at http://www.cordevalle.com/, accessed on November 3, 2007.

[88] 72 FR 48190, Proposed Rule.

Section 3

Incremental Impacts

This section of the report summarizes incremental impacts of critical habitat designation. These are associated with constraints on purchasing compensation land for urban development. Incremental impacts are those impacts that would not exist but for the designation of critical habitat.

3.1. Urban Development

The Service indicates that land purchased as compensation for development to offset adverse modification of designated critical habitat within a given county should occur within the same county (i.e. for development in critical habitat in San Mateo County, compensation land should be purchased in critical habitat in San Mateo County) in order to maintain the functional capacity of critical habitat. This recommendation would occur as a result of considering whether or not development would cause adverse modification of designated critical habitat during section 7 consultation. In other words, the constraint on where land can be purchased to compensate for development impacts would not exist but for the designation of critical habitat for the butterfly.[89]

This recommendation would result in an incremental cost above and beyond that of conservation under listing. Absent the designation of critical habitat, land purchased to compensate for development could be located on any habitat within the range of the species. Thus, the baseline impacts on urban development are those costs associated with purchasing the least expensive compensation land. As explained in Section 2 above, inexpensive land is located in Santa Clara County. After critical habitat is designated, development in San Mateo County must be compensated for by purchasing land within critical habitat in San Mateo County, which is more expensive.

This analysis estimates the incremental impact on urban development in San Mateo County associated with the increase in the price per acre of compensation land.

After the designation of critical habitat, the Service expects that the ratio of compensation land to development will be approximately the same as the historical ratio: 1.5: 1.[90] The price of land set aside as compensation for development in San Mateo County is approximately $150,000 per acre.[91]

As shown in Table 3-1, only five acres of proposed critical habitat in San Mateo County are projected for development. The number of acres that could be developed or set aside for compensation (106 acres) exceeds the sum of the acres projected to be developed (5 acres) and the acres necessary to set aside to compensate for development (7.5, not shown in table). There is enough land within critical habitat in San Mateo County to offset all projected development. Therefore, the recommendation from the Service that compensation for development in a County should occur within critical habitat within the same County does not restrict the amount of future development.

[89] Personal communication with Arnold Roessler, Listing Biologist, U.S. Fish and Wildlife Service, November 19, 2007.
[90] *Ibid.*
[91] Personal communication with David Moser, McCutchen, Doyle, Brown & Enersen, LLP, November 20, 2007.

Table 3-1: Projected Households, Population, and Greenfield Acres, 2008-2030
San Mateo County

Unit	Tract	Projections				Developable Acres in Tract within PCH
		Households	Population	Residential Acres	Commercial / Industrial Acres	
3	06081609700	4	10	1	0	18
3	06081613400	2	5	4	0	88
Total		**6**	**15**	**5**	**0**	**106**

Note: PCH = Proposed Critical Habitat

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) BEC growth allocation model.

Table 3-2 summarizes the incremental impact on urban development in San Mateo County associated with purchasing more expensive compensation land.

Table 3-2: Estimated Incremental Impacts of Compensation
San Mateo County

Unit	Tract	Total Acres Projected for Development	Compensation Acres Needed (1)	Incremental Cost of Compensation (2)
3	06081613400	4	6	$0 - $600,000
3	06081609700	1	1.5	$0 - $150,000
Total		**5**	**7.5**	**$0 - $750,000**

Notes:

(1) Compensation acres needed calculated by multiplying total acres projected by the compensation ratio. Average compensation ratio from past consultations is 1.5 acres of compensation to 1 acre of development.

(2) Incremental cost of compensation calculated by multiplying the compensation acres needed by the difference in the price per acre of compensation land in San Mateo and Santa Clara counties. Price of an acre of compensation land in San Mateo County is around $150,000; in Santa Clara County it is approximately $10,000. The difference is then $140,000 per acre.

(3) The cost of compensation is discounted over 23 years at a three percent discount rate.

(4) Total may not be equal to the sum of the corresponding rows above due to rounding.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) Personal communication with David Moser, McCutchen, Doyle, Brown & Enersen, LLP, November 20, 2007.

(4) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

There may be indirect impacts on urban development from local agencies as a result of the designation of critical habitat. However, such impacts have not been identified at this time.

3.2. Re-Initiation of Consultation

Section 7 consultations that have already been completed for a given project or activity may require re-initiation to address the designation of critical habitat. The costs of re-initiating a consultation, including all associated administrative and project modification costs, are incremental impacts of the designation. Two entities completed section 7 consultation on the butterfly before the designation of critical habitat: Calpine Corporation and Lyon Homes. The Service has stated that Calpine Corporation and Lyon Homes are unlikely to reinitiate consultation in order to address adverse modification.[92]

[92] Personal communication with Mike Thomas, Biologist, U.S. Fish and Wildlife Service, January 7, 2008.

Appendix A: Areas Proposed for Exclusion from Critical Habitat According to Section 4(B)2 of the Act

This section of the analysis describes past and future impacts to the 775 acres proposed for exclusion from critical habitat designation for the butterfly, according to Section 4(b)2 of the Act.[93] The 775 acre area covered by the San Bruno Mountain Habitat Conservation Plan is currently proposed for exclusion from butterfly critical habitat. This analysis forecasts baseline impacts in the area proposed for exclusion of approximately $2.7 million; no incremental impacts are forecast in this area.

A.1 San Bruno Mountain Habitat Conservation Plan

The San Bruno Mountain Habitat Conservation Plan (SBMHCP), adopted in 1983, was the first Habitat Conservation Plan. It covers approximately 3,400 acres in northern San Mateo County and identifies 7 animal species (including the butterfly, which was not listed at the time) and 44 plant species to be conserved. The focus of the plan is the two butterfly species listed at the time (Mission Blue and San Bruno Elfin), the Callippe Silverspot Butterfly, and their host plants. The permit issued by the Service for the San Bruno Habitat Conservation Plan has no provision for incidental take of the Bay Checkerspot Butterfly.[94] However, according to the Service the SBMHCP will finalize an amendment to the SBMHCP to cover the butterfly in 2008.[95]

In April 2001 the Service designated critical habitat for the butterfly that included the historic butterfly habitat on the main ridge of San Bruno Mountain. The critical habitat area included San Bruno Mountain because a small population of the butterfly was present near the summit of San Bruno Mountain up until the mid-1980's.[96] However, the butterfly has not been observed on San Bruno Mountain in over 20 years and no butterfly larvae or adults were observed on San Bruno Mountain by San Mateo County field crews while conducting biological activities and overseeing development activities in 2006.[97] Additionally, there is no plan to reintroduce the butterfly to San Bruno Mountain at this time.[98]

The County of San Mateo manages the SBMHCP area and submits annual reports on its management activities. In 2006, the year of the last available annual report, San Mateo County reported that 611 acres of invasive plants were treated by hand or with herbicides. Many of these acres were treated many times over for repeat control of various species. Since the cessation of cattle grazing in the early 1960's, and the reduction in wildfires

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[93] 72-FR-48185.
[94] San Bruno Mountain HCP Volume 1, available at http://www.traenviro.com/sanbruno/sbmhcp.htm, accessed on October 26, 2007.
[95] Electronic communication with Mike Thomas, Listing Biologist for the US FWS, on January 16, 2008.
[96] San Bruno Mountain HCP Volume 1, available at http://www.traenviro.com/sanbruno/sbmhcp.htm, accessed on October 26, 2007
[97] San Bruno Mountain Habitat conservation Plan Year 2006 Activities Report For Endangered Species Permit PRT-2-9818, available at http://www.traenviro.com/sanbruno/hcp/ann_reports/2006_report.pdf, accessed on October 26, 2007.
[98] Personal communication with Sam Herzberg, Senior Park Planner for San Mateo County Parks, on October 29, 2007.

and controlled burning, native coastal scrub vegetation has been expanding on San Bruno Mountain and overtaking grasslands. This phenomenon has resulted in approximately 180 acres of grassland giving way to coastal scrub since the inception of the HCP in 1982. Management of expanding scrub communities in the plan area requires a combination of burning, grazing, and / or mechanical removal to maintain grasslands; however management is limited by the level of SBMHCP funds. It is probable that San Mateo County Parks will receive a $4 million endowment to amend the SBMHCP to include conservation of the Calippe Silverspot butterfly. San Mateo County Parks would like to use some of these funds to institute a grazing regime and fire management in the area covered by the SBMHCP.

The proliferation of nonnative species also creates conditions for wildfires to spread, which can destroy butterfly habitat. A wildfire in the Brisbane Acres area of San Bruno Mountain occurred in 2006 that burned approximately 34 acres of grassland, brush, and woodland. The fire burned through highly diverse native grasslands and native coastal scrub habitat. This area will require extra management in the future to restore natural conditions by controlling the spread of nonnative species in burned areas.

The SBMHCP controls development in the SBMHCP plan area by limiting the amount and location of development. A total of 310 acres (9 percent) of San Bruno Mountain have been developed since the start of the HCP, or approximately 77 percent of the total development originally allowed under the HCP within the planned parcels. The remaining portion allowed for development is approximately 70 acres. Unplanned parcels, which are parcels that do not currently have a development plan, constitute a total of 305 acres, of which, the City of Brisbane has set aside 40.64 acres as protected open space.[99]

The SBMHCP has an annual budget of approximately $309,000.[100] Thomas Reed Associates is currently contracted to perform butterfly monitoring activities and West Coast Wildlands performs the land conservation efforts.[101] Total estimated future impacts of the SBMHCP that are coextensive with the butterfly are approximately $2.7 million between 2008 and 2030. This analysis only considers conservation efforts that will be conducted after the amendment is finalized. The table below shows the breakdown of the impacts over the 23 year timeframe.

[99] San Bruno Mountain Habitat conservation Plan Year 2006 Activities Report For Endangered Species Permit PRT-2-9818, available at http://www.traenviro.com/sanbruno/hcp/ann_reports/2006_report.pdf, accessed on October 26, 2007. .

[100] San Bruno Mountain Habitat Management Plan 2007, prepared by San Mateo County Parks on September 2007, available at http://www.eparks.net/vgn/images/portal/cit_609/0/21/1096091514part1.pdf, accessed on October 29, 2007.

[101] Personal communication with Sam Herzberg, Senior Park Planner for San Mateo County Parks, on October 29, 2007.

Table A-1: Estimated Economic Impacts of SBMHCP		
Conservation Effort	**Future Impacts**	**Annualized Future Impacts**
HCP Management Contracts (TRA biological monitoring)	$444,000	$26,200
HCP Management Contracts (WCW/Shelterbuilt)	$1,437,500	$84,874
County Staff HCP Admin	$340,000	$20,000
County Staff Contract Management	$250,000	$15,000
County Staff (Administrative Support)	$130,000	$7,700
Auditing Contract	$70,000	$4,000
Other Services and Supplies	$20,000	$1,000
Total	**$2,700,000**	**$160,000**

Note:

(1) Impacts from the SBMHCP are calculated as of 2008 when the SBMHCP will be amended to include the Bay Checkerspot Butterfly

Source:

(1) SBMHCP Budget Projection, October 11, 2007.

Appendix B: Past Costs

The consultation history provides information on previous actions that were taken for the butterfly such as avoidance and compensation. This section of the report describes economic impacts of butterfly conservation that have occurred since the listing of the species in 1987. Specifically, it outlines the economic impacts of undergoing and complying with a section 7 consultation for the butterfly to: Valley Transportation Authority / The City of San Jose, Waste Management Inc., Santa Clara Valley Water District, William Lyon Homes Inc., Calpine Corporation, Stanford University, and SFPUC. These impacts may include the cost of efforts that benefit other species and the butterfly at the same time.

B.1 Valley Transportation Authority and the City of San Jose

Santa Clara Valley Transportation Authority (VTA) is an independent special district responsible for bus and light rail operations, congestion management, specific highway improvement projects, and countywide transportation planning. VTA is both a transit provider, and a multi-modal transportation planning organization involved with transit, highways and roadways, bikeways, and pedestrian facilities.[102]

As a result of a section 7 consultation with the Service for the US Highway 101 Widening and 85/101 Interchange Projects, VTA and the City of San Jose were required to acquire and provide for the long term conservation of 669 acres of land, including 417 acres of serpentine soil habitat. In addition, VTA was required to provide staff support for the development and implementation of the Santa Clara Valley Habitat Conservation Plan (as described in Section 3).[103] At the time of purchase, the only available serpentine property of an adequate size was on Coyote Ridge. This gave the property owner substantial advantage in negotiations, and VTA was required to purchase 548 acres, comprised of an existing established environmental subdivision and the originally required 417 acres. VTA placed eight acres of the serpentine soil and three acres of red-legged frog habitat into a VTA conservation bank. VTA intends to use this land as compensation land for their future projects. VTA also prepared a Resource Management Plan for the compensation area, and conducted improvements and baseline studies. Other costs to VTA were for land appraisal, land surveys, an environmental study, and administrative costs. VTA and the City of San Jose pay Santa Clara Open Space Authority to manage the lands through an endowment.[104]

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[102] VTA website, available at http://www.vta.org/inside/about/vision.html, accessed on November 20, 2007.

[103] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the U.S. Highway 101 Widening, Route 85/U.S. 101 South Interchange, Riparian and Wetland Consolidated Biological Mitigation Project, Bailey Avenue Extension/U.S. 101 Interchange, and Coyote Valley Research Park Projects, San Jose and Santa Clara County, California, on July 31, 2001.

[104] Electronic communication with Tom Fitzwater, Environmental Planning Manager at VTA, on November 1, 2007.

Total past impacts, as described in Table B-1, to VTA and the City of San Jose are estimated at $6.4 million.

Table B-1: Estimated Economic Impacts to Valley Transportation Authority	
Conservation Effort	**Past Impacts**
Land acquisition	$5,000,000
Land management Endowment	$1,100,000
Resource Management Plan	$80,000
First year improvements and baseline studies	$60,000
Appraisal, land study, Phase 1 study, staff time	$100,000
Total	**$6,400,000**
Source: (1) Environmental Planning Manager for VTA.	

B.2 Waste Management

Waste Management Inc. is the largest provider of waste and environmental services in North America. The company's network of operations includes 413 collection operations, 370 transfer stations, 283 active landfill disposal sites, 17 waste-to-energy plants, 131 recycling plants, 95 beneficial-use landfill gas projects and 6 independent power production plants. Waste Management offers waste services to nearly 21 million residential, industrial, municipal and commercial customers.[105]

In 2003 Waste Management underwent formal section 7 consultation with the Service for its Kirby Canyon Recycling Facility (KCRF), located in the east foothills of the Santa Clara Valley. Formal consultation for the butterfly was triggered by the need to get a new permit from the Army Corps of Engineers for a second phase of the project to fill an additional 1.86 acres of wetlands and waters of the United States. The consultation covered the butterfly and its habitat, as well as two other federally endangered species. As a result of consultation, Waste Management manages a 250 acre preserve for the butterfly with continued butterfly monitoring and grazing. Additionally, Waste Management will revegetate the landfill with serpentine grassland habitat and conduct an employee education program.[106]

As of the writing of this draft of the report, Waste Management could not be contacted to determine the impact of managing the preserve, revegetating the old landfill, and educating its employees.

[105] Waste Management website, available at http://www.wm.com/wm/about/Overview.asp, accessed on October 31, 2007.

[106] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the Proposed Kirby Canyon Recycling and Disposal Facility, Santa Clara County, California, on July 9, 2003.

B.3 Santa Clara Valley Water District

Santa Clara Valley Water District (SCVWD) is the primary water resources agency for Santa Clara County. It acts as Santa Clara County's water wholesaler and also as its flood protection agency and is the steward for its streams and creeks, underground aquifers and district-built reservoirs. SCVWD stream stewardship responsibilities include creek restoration and wildlife habitat projects, pollution prevention efforts and natural flood protection.[107]

SCVWD underwent a formal section 7 consultation in 2002 in order to obtain a ten year maintenance permit for its Stream Maintenance Program (SMP). The need for maintenance arose from past modifications to natural streams and from land use changes in these watersheds. SCVWD routinely removes sediment and vegetation from streams, canals, and associated facilities to achieve the desired capacity for water conveyance. Vegetation also is removed from streams and canals to provide vehicle access and fire prevention. SCVWD conducts bank protection to restore eroded flood protection facilities and protect property. [108] These activities could all threaten butterfly host plants.

The consultation covered a number of threatened and endangered species, including the butterfly. To compensate for wetland, riparian, and endangered species habitat loss the SMP included a regional management program. Measures included conducting routine surveys to obtain data on the distribution and abundance of special status species. To address effects to the butterfly and its habitat, SCVWD hired a qualified biologist to survey all project sites in serpentine areas during the appropriate time of year to identify serpentine plants. Areas supporting serpentine plants or the butterfly were permanently marked in the field and protected by a 100 foot buffer zone. SCVWD annually evaluates and modifies the program as needed.[109]

Estimated impacts to SCVWD of conservation efforts attributable only to the butterfly are difficult to determine because the regional management program was aimed to conserve a large number of species. In addition, SCVWD does not retain estimates on the cost of retaining a biologist and does not plan to undertake most of the planned maintenance work in the future.[110]

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[107] Santa Clara Valley Water District website, available at http://www.valleywater.org/Water/Where_Your_Water_Comes_From/index.shtm, accessed on November 2, 2007.

[108] US Fish and Wildlife Service to Mr. Calvin C. Fong, San Francisco District US Army Corps of Engineers, Formal Endangered Species Consultation on the Santa Clara Valley Water District Ten-Year Maintenance Permit, July 5, 2002.

[109] Ibid.

[110] Electronic communication with Bill Smith, Senior Environmental Planner in the Regulatory Compliance Unit for SCVWD, on November 5, 2007.

B.4 William Lyon Homes

William Lyon Homes Inc. (Lyon Homes) has built more than 100,000 new homes in California, Nevada and Arizona and is one of the nation's largest homebuilders. In 2000, Lyon Homes consulted with the Service on its Ranch on Silver Creek development in San Jose. The project involved constructing 178 acres of single-family and multi-family residential homes and infrastructure, 156 acres of golf course development, 6 acres of city recreational park, and 240 acres of open space.

As a result of the consultation, Lyon Homes had to carry out a number of conservation efforts for the butterfly including: conducting annual surveys for ten years, carrying out a dust control program, and preparing a golf course pesticide management program. Lyon Homes purchased 285 acres of off-site compensation and acquired and managed a 190 acre on-site butterfly preserve. Lyon Homes protects this land with a permanent conservation easement and developed and implemented a Restoration and Management Plan to include a program of managed grazing, fencing, and native plants restoration.

As of the writing of this draft of the report, Lyon Homes could not be contacted to determine the impact of conducting surveys and managing the preserve.

B.5 Calpine Corporation

For a description of past measures taken by Calpine Corporation please see Section 2 above.

Table B-2: Estimated Economic Impacts to Calpine

Conservation Effort	Past Impacts
Land acquisition and endowment on Tulare Hill	$3,190,000
Land acquisition and endowment on Coyote Ridge	$720,000
Biological surveys and reporting on CH2M Hill	$139,100
Hire biologist to conduct field work	$199,370
Control invasive plants	$30,000
Other maintenance efforts	$21,600
Silicon Valley Land Conservancy	$97,720
Total	**$4,400,000**

Source:
(1) Executive Director of Silicon Valley Land Conservancy.

B.6 Stanford University

For a description of past measures taken by Stanford University please see Section 2 above.

Table B-3: Estimated Economic Impacts to Stanford University	
Conservation Effort	**Past Impacts**
Research support	$294,500
Sources: (1) Stanford University Jasper Ridge Biological Preserve website.	

B.7 San Francisco Public Utilities Commission

For a description of past measures taken by SFPUC please see Section 2 above.

Table B-4: Estimated Economic Impacts to SFPUC	
Conservation Effort	**Past Impacts**
Butterfly monitoring	$120,000
Sources: (1) Planner for SFPUC Watershed Group.	

Appendix C: SBREFA Screening Analysis and Impacts on the Energy Industry

This appendix considers the extent to which incremental impacts from critical habitat designation could be borne by small entities and the energy industry. When a Federal agency proposes regulations, the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).[111] No initial regulatory flexibility analysis (IRFA) is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for butterfly conservation efforts to affect small entities. Information for this analysis was gathered from the Small Business Administration (SBA), the Service, and from interviews with stakeholders contacted in the development of the economic analysis. The energy analysis in Section C.2 is conducted pursuant to Executive Order No. 13211.

The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts associated with the proposed critical habitat designation, and not the post-designation baseline impacts of butterfly conservation. The incremental impacts of the rulemaking are considered most relevant for the small business and energy impacts analyses as they are expected to stem from the critical habitat designation, and are therefore not expected to occur in the case that critical habitat is not designated for the butterfly. The post-designation baseline impacts associated with the listing of the butterfly, as quantified in Section 2 of this report, are expected to occur regardless of the outcome of this rulemaking and are therefore not considered in terms of their impacts on small businesses and the energy industry.

C.1 SBREFA Analysis

To ensure broad consideration of impacts on small entities, the Service has prepared this small business analysis without first making the threshold determination whether the proposed critical habitat designation could be certified as not having a significant economic impact on a substantial number of small entities.

Summary of Impacts on Small Entities

The analysis is based on the estimated incremental impacts associated with the proposed rulemaking as described in Section 3 of the analysis. The analysis evaluates the potential for economic impacts related to activity categories, including urban development and consultation re-initiation.

[111] 5 U.S.C. 601 et seq.

The following table identifies which land managers may be impacted by the proposed rule and summarizes whether or not they meet the small entity definition.

Table C-1: Size Standards for Potentially Affected Entities		
Entity	**SBA Size Standard**	**Meets SBA's Definition of a Small Entity?**
Private Landowners	Business that is independently owned and operated and not dominant in field.	No
Notes:		
(1) There are no entities considered small for the purposes of this analysis of the entities that are likely to bear incremental impacts. (2) Individual private landowners are not considered small businesses for the purposes of this analysis. Sources: (1) Size standard for NAICS code 221119 and code 236115/6 from NAICS Association, "Small Business Size Standards - Matched to NAICS," at http://www.naics.com/sba_sizestandards.htm, accessed on November 20, 2007.		

Table C-1 lists the Small Business Administration's (SBA's) standard defining "small" entities for each government, organization, or business potentially affected. No entities that are likely to bear incremental impacts from the proposed rule are identified as small entities. There are only 5 acres being considered for designation that are privately owned and may be affected by critical habitat. By definition, private landowners are not small businesses. To the extent that a private landowner does operate a business that relies on the potentially affected land, this would be considered in this small business analysis. No information suggests, however, that this is the case. This analysis therefore does not forecast impacts to small entities associated with the designation on private land.

C.2 Potential Impacts on the Energy Industry

Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[112]

The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may institute "a significant adverse effect" when compared with the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 barrels per day;

[112] Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance for Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, http://www.whitehouse.gov/omb/memoranda/m01-27.html.

- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million Mcf per year;
- Reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[113]

Calpine Corporation owns land in critical habitat Unit 5, which it purchased as mitigation for the Los Esteros and Metcalf Energy Center projects. Calpine does not plan to expand its facilities nor construct new facilities in this area and has previously consulted on these projects' effect on the butterfly. Designation of critical habitat is not expected to lead to any adverse outcomes such as a reduction in electricity production or an increase in the cost of energy production or distribution.

[113] *Ibid.*

Appendix D: Present Value and Alternative Discount Rates

D.1 Calculating Present Value and Annualized Impacts

For each land use activity, this analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or a stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in terms of today's dollars. Translation of economic impacts of past and future costs to present value terms requires the following information: a) past or projected future costs of conservation efforts; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts of conservation efforts (PV_c) from year t to T is measured in today's dollars according to the following standard formula: [114] $PVc = \sum_{t}^{T} \frac{Ct}{(1+r)^{T-t}}$

Where C_t is the cost of conservation efforts in year t and r is the discount rate.[115]

Impacts of conservation efforts for each activity in each unit are also expressed in annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, however, all activities employ the forecast period of 23 years, 2008 through 2030.[116] Annualized impacts of future conservation efforts (APV_c) are calculated by the following standard formula: $APVc = PVc\left[\frac{r}{1-(1+r)^{-(N)}}\right]$ Where N is the number of years in the forecast period (in this analysis, 23 years).

D.2 Effects of Alternative Discount Rates

This analysis uses a three percent discount rate. Alternatively, economic impacts can be calculated in undiscounted values or using a seven percent discount rate. The tables below show the effects of using these alternative discount rates.

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[114] To derive the present value of past conservation efforts for this analysis, t is 1998 and T is 2008; to derive the present value of future conservation efforts, t is 2008 and T is 2030.

[115] To discount and annualize costs, guidance provided by OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003).

[116] Impacts were calculated to 2030 (a 23 year time frame) to accommodate the housing and population projection data from ABAG (see Section 2 for explanation of ABAG data).

Table D-1: Summary of Estimated Baseline Economic Impacts

Unit	Entity/Plan	Past Impacts		Future Impacts		Annualized Future Impacts	
		Undiscounted	Present Value (7%)	Undiscounted	Present Value (7%)	Undiscounted	Present Value (7%)
5,6,7, 9a,10,12	Private Landowners	$0	$0	$530,000,000	$260,000,000	$23,000,000	$23,000,000
3	Private Landowners	$0	$0	$0 - $720,000	$0 - $350,000	$0 - $31,000	$0 - $31,000
2,3,4,5, 6,7,8,11	Other Conservation Efforts	$320,000	$630,000	$570,000	$290,000	$24,000	$24,000
5	Calpine	$3,700,000	$5,500,000	$1,700,000	$890,000	$74,000	$74,000
	VTA	$5,000,000	$9,000,000	$0	$0	$0	$0
5,6,7,8,9a, 9b,10,11,12	SCVHCP / NCCP	$0	$0	$15,000,000	$7,000,000	$1,000,000	$1,000,000
Total		**$9,000,000**	**$15,000,000**	**$550,000,000**	**$270,000,000**	**$24,000,000**	**$24,000,000**

Note:

(1) Impacts are presented in 2008 dollars.

(2) Total not presented as range because the range of impacts to private landowners in unit 3 is much smaller than the total. Range is lost when rounding the total.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) DataQuick Information Systems.

(4) Marshal and Swift Construction Costs.

(5) Office of Federal Housing Enterprise Oversight.

(6) Principal, Jones & Stokes.

(7) Environmental Planning Manager for VTA.

(8) Stanford University Jasper Ridge Biological Preserve website.

(9) Planner for SFPUC Watershed Group.

(10) Muni Financial, Financial Consultant for the SCVHCP/NCCP.

(11) SCVHCP Budget Model from November 2007.

Table D-2: Summary of Estimated Incremental Economic Impacts					
		Future Impacts		Annualized Future Impacts	
Unit	Entity	Undiscounted	Present Value (7%)	Undiscounted	Present Value (7%)
3	Private Landowners	$0 - $1,100,000	$0 - $510,000	$0 - $46,000	$0 - $46,000

Note:

(1) Impacts are presented in 2008 dollars.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) Personal communication with David Moser, McCutchen, Doyle, Brown & Enersen, LLP, November 20, 2007.

(4) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

Table D-3: Summary of Estimated Economic Impacts in Areas Proposed for Exclusion from Critical Habitat According to Section 4(b)2 of the Act					
		Future Impacts		Annualized Future Impacts	
Unit	Management Plan	Undiscounted	Present Value (7%)	Undiscounted	Present Value (7%)
1	SBMHCP	$3,600,000	$1,900,000	$160,000	$160,000

Note:

(1) Impacts are presented in 2008 dollars.

Source:

(1) SBMHCP Budget Projection, October 11, 2007.

Table D-4: Estimated Economic Impacts of Draft SCVHCP / NCCP												
	Undiscounted	PV (7%)	Undiscounted	PV (7%)	Undiscounted	PV (7%)	Undiscounted	PV (7%)	Undiscounted	PV (7%)	Undiscounted	PV (7%)
Budget Category	**2009**		**2010-2014**		**2015-2019**		**2020-2024**		**2025-2029**		**2030**	
Program Administration	$34,000	$32,000	$207,000	$158,000	$234,000	$127,000	$277,000	$107,000	$322,000	$89,000	$66,000	$15,000
Land Acquisition	$0	$0	$1,430,000	$1,091,000	$1,255,000	$683,000	$1,255,000	$487,000	$1,255,000	$347,000	$458,000	$103,000
Habitat Restoration/ Creation	$370	$350	$709,000	$541,000	$833,000	$453,000	$964,000	$374,000	$1,120,000	$310,000	$241,000	$54,000
Environmental Compliance	$0	$0	$30,000	$23,000	$35,000	$19,000	$40,000	$16,000	$46,000	$13,000	$10,100	$2,300
Reserve Management and Maintenance	$5,100	$4,800	$284,000	$217,000	$420,000	$228,000	$450,000	$175,000	$594,000	$164,000	$121,000	$27,000
Water Supply & Fish Habitat Management	$0	$0	$66,000	$50,000	$77,000	$42,000	$89,000	$35,000	$103,000	$28,000	$22,600	$5,100
Recreation and Public Access	$1,500	$1,400	$35,000	$27,000	$47,000	$26,000	$64,000	$25,000	$84,000	$23,000	$21,000	$4,700
Monitoring, Research, and Adaptive Management	$440	$410	$111,000	$85,000	$129,000	$70,000	$146,000	$57,000	$172,000	$48,000	$39,000	$9,000
Remedial Measures	$150	$140	$6,100	$4,700	$8,500	$4,600	$11,500	$4,500	$14,500	$4,010	$3,210	$720
Contingency Fund	$61,000	$57,000	$213,000	$162,000	$252,000	$137,000	$292,000	$113,000	$342,000	$95,000	$74,000	$17,000
Total (each period)	**$100,000**	**$100,000**	**$3,100,000**	**$2,400,000**	**$3,300,000**	**$1,800,000**	**$3,600,000**	**$1,400,000**	**$4,100,000**	**$1,100,000**	**$1,100,000**	**$200,000**
Total Future (undiscounted)	**$15,000,000**											
Total Future (PV, 7%)	**$7,000,000**											

Notes:
(1) Land acquisition costs were adjusted to $2008 using the Home Price Index from the U.S. Office of Federal Housing Enterprise Oversight. All other costs were adjusted to $2008 dollars using th Consumer Price Index (CPI) for the San Francisco-Oakland-San Jose Metropolitan Service Area from the U.S. Bureau of Labor Statistics.
Source:
(1) SCVHCP / NCCP Budget Model from November 2007.

Table D-5: Estimated Baseline Impacts of Avoiding Development in Reserve System
Santa Clara County

Unit	Tract	Residential Acres Avoided	Commercial/ Industrial Acres Avoided	Total Acres Avoided	Value of Developed Land	Cost of Avoidance (Undiscounted)	Cost of Avoidance (Present Value 7%)
7	06085511911	16	0	16	$2,000,000	$32,000,000	$16,000,000
5, 7, 9a	06085512100	98	14	112	$1,900,000	$210,000,000	$100,000,000
5	06085512001	10	16	26	$6,700,000	$170,000,000	$85,000,000
5	06085503328	9	0	9	$8,100,000	$73,000,000	$36,000,000
6	06085512035	9	0	9	$4,600,000	$42,000,000	$20,000,000
10	06085512305	10	0	10	$710,000	$7,100,000	$3,500,000
12	06085512401	0	0	0	$560,000	$0	$0
Total		**152**	**30**	**182**		**$530,000,000**	**$260,000,000**

Notes:

(1) Cost of avoidance calculated by multiplying the total acres avoided by the value of developed acres.

(2) Cost of avoidance is discounted over 23 years using the discount rate indicated.

(3) Total may not be equal to the sum of the corresponding rows above due to rounding.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.

(3) BEC growth allocation model.

(4) DataQuick Information Systems.

(5) Office of Federal Housing Enterprise Oversight.

(6) Marshal and Swift Construction Costs.

(7) Development impact fees obtained from Palo Alto, San Jose, and Morgan Hill Engineering Departments.

Table D-6: Estimated Baseline Impacts of Fees
Santa Clara County

Unit	Tract	Residential Acres Developed	Commercial/ Industrial Acres Developed	Total Acres Developed	Cost of Fees (Undiscounted)	Cost of Fees (Present Value 7%)
7	06085511911	57	0	57	$630,000	$310,000
5, 7, 9a	06085512100	39	5	44	$480,000	$240,000
5	06085512001	4	7	11	$120,000	$59,000
5	06085503328	3	0	3	$33,000	$16,000
6	06085512035	2	0	2	$22,000	$11,000
10	06085512305	2	0	2	$22,000	$11,000
12	06085512401	1	0	1	$11,000	$5,400
Total		**108**	**12**	**120**	**$1,300,000**	**$650,000**

Notes:

(1) Cost of fees calculated by multiplying the total developed acres by the fee per acre.

(2) Cost of fees is discounted over 23 years using discount rate indicated.

(3) Fee on an acre of development in Santa Clara County under the SCVHCP / NCCP is approximately $11,000.

(4) Total may not be equal to the sum of the corresponding rows above due to rounding.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Electronic communications from GIS Analyst at Jones & Stokes, consultant for the SCVHCP / NCCP, January 17, 2008 and November 9, 2007.

(3) BEC growth allocation model.

(4) Review of relevant biological opinions.

Table D-7: Estimated Baseline Impacts of Compensation
San Mateo County

Unit	Tract	Residential Acres	Commercial/ Industrial Acres	Total Acres	Cost of Mitigation (Undiscounted)	Cost of Compensation (Present Value 7%)
3	06081613400	4	0	4	$0 - $60,000	$0 - $29,000
3	06081609700	1	0	1	$0 - $15,000	$0 - $7,000
Total		**5**	**0**	**5**	**$0 - $75,000**	**$0 - $37,000**

Notes:

(1) Average compensation ratio from past consultations is 1.5 acres of compensation to 1 acre of development.

(2) Price of an acre of land in Santa Clara County is approximately $10,000.

(3) Total may not be equal to the sum of the corresponding rows above due to rounding.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

Table D-8: Estimated Baseline Impacts of Delay

San Mateo County

Unit	Tract	Value of Developed Land	Total Projected Acres	Development Surplus[1]	Delay Impacts [2] (Undiscounted)	Delay Impacts [2] (Present Value 7%)
3	06081609700	$5,700,000	1	$5,700,000	$0 - $430,000	$0 - $210,000
3	06081613400	$710,000	4	$2,900,000	$0 - $210,000	$0 - $100,000
Total			**5**		**$0 - $640,000**	**$0 - $310,000**

Notes:

(1) Development surplus calculated by multiplying the value of developed land by the total acres projected to be developed.

(2) Delay impacts calculated by multiplying the development surplus by the risky interest rate and the delay time.

Delay impacts are discounted over 23 years at the discount rate indicated.

(3) Average interest rate of a risky investment is assumed to be fifteen percent.

(4) Average delay time according to the consultation history is 6 months.

(5) Numbers may not sum due to rounding.

Sources:

(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.

(2) Review of relevant biological opinions

(3) DataQuick Information Systems.

(4) Marshal and Swift Construction Costs.

(5) Office of Federal Housing Enterprise Oversight.

Table D-9: Estimated Economic Impacts to Calpine

	Past Impacts		Future Impacts		Annualized Future Impacts	
Conservation Effort	**Undiscounted**	**Present Value (7%)**	**Undiscounted**	**Present Value (7%)**	**Undiscounted**	**Present Value (7%)**
Land acquisition and endowment on Tulare Hill	$2,670,000	$4,010,000	$0	$0	$0	$0
Land acquisition and endowment on Coyote Ridge	$600,000	$910,000	$0	$0	$0	$0
Biological surveys and reporting on CH2M Hill	$125,300	$159,800	$480,200	$251,800	$20,880	$20,880
Hire biologist to conduct field work	$179,550	$229,050	$688,280	$360,930	$29,930	$29,920
Control invasive plants	$30,000	$40,000	$100,000	$60,000	$4,000	$5,000
Other maintenance efforts	$19,400	$24,800	$74,500	$39,100	$3,240	$3,240
Silicon Valley Land Conservancy	$88,010	$112,300	$337,400	$176,900	$14,670	$14,670
Total	**$3,700,000**	**$5,500,000**	**$1,700,000**	**$890,000**	**$73,000**	**$74,000**

Source:

(1) Executive Director of Silicon Valley Land Conservancy

Table D-10: Estimated Economic Impacts of Other Butterfly Conservation Efforts

	Past Impacts		Future Impacts		Annualized Future Impacts	
Conservation Effort	**Undiscounted**	**Present Value (7%)**	**Undiscounted**	**Present Value (7%)**	**Undiscounted**	**Present Value (7%)**
Estimated Economic Impacts to Stanford University						
Research support	$206,000	$491,000	$215,400	$112,900	$9,365	$9,361
Estimated Economic Impacts to SFPUC						
Butterfly monitoring	$110,000	$140,000	$350,000	$180,000	$15,000	$15,000
Total Costs	**$320,000**	**$630,000**	**$570,000**	**$290,000**	**$24,000**	**$24,000**

Sources:
(1) Stanford University Jasper Ridge Biological Preserve website.
(2) Planner for SFPUC Watershed Group.

Table D-11: Estimated Incremental Impacts of Compensation
San Mateo County

Unit	Tract	Total Acres Projected for Development	Compensation Acres Needed (1)	Incremental Impacts of Compensation (Undiscounted)	Incremental Impacts of Compensation (Present Value 7%)
3	06081613400	4	6	$0 - $840,000	$0 - $410,000
3	06081609700	1	1.5	$0 - $210,000	$0 - $100,000
Total		**5**	**7.5**	**$0 - $1,100,000**	**$0 - $510,000**

Notes:
(1) Compensation acres needed calculated by multiplying total acres projected by the compensation ratio. Average compensation ratio from past consultations is 1.5 acres of compensation to 1 acre of development.
(2) Incremental cost of compensation calculated by multiplying the compensation acres needed by the difference in the price per acre of compensation land in San Mateo and Santa Clara counties. Price of an acre of compensation land in San Mateo County is around $150,000; in Santa Clara County it is approximately $10,000. The difference is then $140,000 per acre.
(3) The cost of compensation is discounted over 23 years at the discount rate indicated.
(4) Total may not be equal to the sum of the corresponding rows above due to rounding.
Sources:
(1) Association of Bay Area Governments, Projections 2007 by Census Tract for San Mateo and Santa Clara County.
(2) Review of relevant biological opinions
(3) Personal communication with David Moser, McCutchen, Doyle, Brown & Enersen, LLP, November 20, 2007.
(4) Electronic communication with Jeff Kay at Muni Financial, consultant contracted for the SCVHCP / NCCP, November 2, 2007.

Table D-12: Estimated Economic Impacts of SBMHCP				
	Future Impacts		Annualized Future Impacts	
Conservation Effort	Undiscounted	Present Value (7%)	Undiscounted	Present Value (7%)
HCP Management Contracts (TRA bio monitoring)	$603,000	$316,000	$26,200	$26,200
HCP Management Contracts (WCW/Shelterbuilt)	$1,952,100	$1,023,700	$84,874	$84,875
County Staff HCP Admin	$460,000	$240,000	$20,000	$20,000
County Staff Contract Management	$350,000	$180,000	$15,000	$15,000
County Staff (Administrative Support)	$170,000	$90,000	$7,400	$7,500
Auditing Contract	$90,000	$50,000	$4,000	$4,000
Other Services and Supplies	$20,000	$10,000	$1,000	$1,000
Total	**$3,600,000**	**$1,900,000**	**$160,000**	**$160,000**

Note:

(1) Impacts from the SBMHCP are calculated as of 2008 when the SBMHCP will be amended to include the Bay Checkerspot Butterfly.

Source:

(1) SBMHCP Budget Projection, October 11, 2007.

Table D-13: Estimated Economic Impacts to Valley Transportation Authority		
	Past Impacts	
Conservation Effort	Undiscounted	Present Value (7%)
Land acquisition	$4,000,000	$7,000,000
Land management Endowment	$840,000	$1,400,000
Resource Management Plan	$60,000	$100,000
First year improvements and baseline studies	$50,000	$90,000
Appraisal, land study, Phase 1 study, staff time	$100,000	$200,000
Total	**$5,000,000**	**$9,000,000**

Source:

(1) Environmental Planning Manager for VTA.

Appendix E: Technical Information for Impacts on Urban Development

E.1 Projected Development in Proposed Critical Habitat

This section of the appendix explains how this analysis projects household, population, and acre growth in the areas of critical habitat. Specifically, this section of the report explains the analysis behind tables 2-2, 2-3, and 2-6.

E.1.1 ABAG Projections

To determine the increase in new homes within critical habitat, census tracts are used as the geographic unit of analysis. The census tract is the finest level of distinction at which the applicable data are published. Predicting growth at the smallest geographic unit possible is important because local or even neighborhood-level characteristics can be responsible for a high degree of heterogeneity in the effects of habitat conservation. A unit-level analysis may not be sensitive enough to discern any noticeable effects even though the effects are large on a smaller scale.

The primary sources for estimates of future housing and population was the study area's federally designated Metropolitan Planning Organization (MPO). Created by county governments, these forecasts are the preferred source for growth estimates because they are created using detailed knowledge about local growth trends and characteristics, potentially resulting in more accurate estimates than those obtained with mathematical forecasting techniques. The organization which created the estimates used in this analysis is ABAG, the Association of Bay Area Governments.

E.1.2 BEC Growth Allocation Model

While ABAG provides growth projections for each census tract, it is also necessary to allocate this growth within the census tract. It is important not to assume growth will occur uniformly within each census tract because the boundary of critical habitat does not usually match that of census tracts. Certain areas of proposed critical habitat may be unsuitable for development; conserving this habitat will not result in any additional costs. Conversely, conserved habitat may occupy the last portions of undeveloped land within a tract, meaning the majority of future development in a census tract will be projected to occur within the species' habitat. These scenarios illustrate the need for more precise growth allocation.

Allocating growth within each census tract requires modeling the process of the conversion of undeveloped land into an urban landscape (which the analysis refers to as "Greenfield development"). This analysis utilizes a growth allocation model created by Berkeley Economic Consulting.

This statistical model incorporates both spatial and non-spatial data to project urban growth in California. Its explanatory variables include demand variables, pertaining to job accessibility and income level; location-specific variables, such as freeway proximity, whether the land is classified as farmland, and whether it lies in a flood-plain;

neighborhood variables, modeling the geography of a location's neighbors; and regulatory variables, such as whether a location is in an incorporated city.

The land use forecasting model analyzes the state by dividing it into a matrix of grid cells. It outputs a probabilistic score (between 0 and 1) that a given cell will be converted from undeveloped to developed within the next 23 years. For each census tract, the sum of the probabilistic scores within the critical habitat area is divided by the sum of the probabilistic scores within the census tract to determine the share of development within the tract that is projected to occur within the area of critical habitat.

E.2 Value of Developed Land

The value of developed land is estimated by evaluating the following equation:

$$v = \frac{p - k}{\lambda}$$

The condition implies that the value of developed land (v) is equal to the difference between the selling price of a new house and the cost of developing the new house, divided by the inverse density (acres per house).

Data on the selling prices of new homes were obtained from DataQuick Information Systems, which maintains a database of new home transactions in the study area. Based on information gathered from county recorders and assessors, the database provides a rich set of house descriptors, including assessor's parcel number, census tract, home size, lot size, number of stories, number of bedrooms, number of bathrooms, build year, sale price, and sale date for all transactions dating back to 1997. Each observation is spatially referenced by census tract using a geographic information system (GIS).

Because California home prices have roughly tripled in the past decade, the nominal sale prices reported by DataQuick are not directly comparable across time. The prices were inflated to real dollars using the Office of Federal Housing Enterprise Oversight's home price index. This index provides quarterly data on price inflation for detached, single-family dwellings by metropolitan statistical area (MSA).

The cost of development includes construction costs, design costs, and local development impact fees. Construction costs include labor and materials. Design costs include architecture, grading, utilities, provision of common space. Development impact fees include utility hookup charges and other local charges. Data on the cost of construction was obtained from Marshall & Swift, which publishes a quarterly guide to building cost per square foot indexed by region, construction quality (average, good, very good, or excellent), and home size. New homes were assumed to be one story, stud-framed with stucco siding and of either average or good construction quality, which is typical for newly constructed tract homes. The design cost is assumed to be equal to twenty percent of the cost of construction. Development impact fees (which include local fees such as

utility hookups and are included in the cost of house development, "*k*") were collected from the engineering and planning departments in the local governments where critical habitat is proposed.

The inverse density of development (acres per house) was estimated in each census tract to be the number of acres projected for development divided by the number of houses projected to be built. Both of these variables were obtained from the ABAG projections.